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Digging the World's Longest Tunnel

Patrick McGovern, Inc., hole through 20-mile bore, 500 feet below sea level, requiring 1,810,000 cubic yards of excavation.

By Spencer A. Jones

Special 1¼-yard Bucyrus-Erie air-operated tunnel shovel mucking rock in City Tunnel No. 2. Air-operated crane on rear for shifting muck cars from empty track to loading track. Because of their rugged construction the Bucyrus-Erics were assigned the heaviest of the rock excavation.

TRY TO IMAGINE digging a tunnel 20 miles long and wider and higher than the average single-track railway tunnel! Then imagine that before you can start digging the tunnel you have to excavate shafts 14 to 17 feet in diameter down to 500 feet below sea level to reach the level where the tunnel is to be dug!

The Board of Water Supply of the City of New York imagined it through the minds of George J. Gillespie, President; James P. Sinnott and his successor, Wm. F. Delaney, and Philip F. Donohue. Chief Engineer Thaddeus Merriman, and his staff and Department Engineer Walter E. Spear and his designing engineers not only imagined it but also showed how it should and could be done.

Why New York needed this tunnel

New York City uses about one billion gallons of water daily. The Croton system partially supplies the Bronx and Manhattan; ground water plants partially supply Queens, Brooklyn and Richmond, but more than 60 per cent of all water comes from the great Catskill system which supplies water to all five boroughs.

By 1940 it is estimated that New York will be using from one to one and one-quarter billion gallons daily, of which the Catskill system must supply an increased percentage aided by the proposed Delaware River System.

Since 1917, when the Catskill water was first brought to New York, a single tunnel has been conveying it from the Hill View Reservoir in Yonkers, south under the Bronx and Manhattan Island, and under the East River from the southern part of Manhattan Island to Brooklyn. This tunnel, known as Tunnel No. 1, carrying the major portion of all New York's water, has been overtaxed for several years, but it has neither been shut down nor repaired since its completion. Any shut-down of this vital artery for an appreciable period would be disastrous; in fact a major catastrophe, particularly for Brooklyn.

To reduce the load on Tunnel No. 1, to improve pressure conditions, to reduce fire hazards in every borough, and for prevention of damage should there

Special 1¼-yard Bucyrus-Erie air-operated tunnel shovel taking the first bite after the shot. This portion of City Tunnel No. 2 has steel-supported roof through bad rock conditions. It doesn't look as if the shovel could clear the side wall, but it does clear and muck cars (made by American Car and Foundry Company) can be loaded at the side or on a three-quarter swing to rear of the shovel. Note the frost on the exhaust pipe. The biggest objection to air operation is that you can't keep your coffee hot.

be a necessity of shutting off Tunnel No. 1, the Board of Water Supply was authorized in 1927 to construct another tunnel from the Hill View Reservoir under Bronx, Queens and Brooklyn boroughs to a terminal shaft in South Brooklyn—a distance of 20 miles.

The new tunnel is called Tunnel No. 2 and it will be so connected with Tunnel No. 1 that water can be delivered through either or both the tunnels in such proportions as may be required. The pressure in the tunnels will be so great that the water they carry will rise 280 feet above sea level without the aid of pumps.

Tunnel No. 2 is a circular, concrete-lined, pressure tunnel with gate chambers, valve chambers, waterway shafts and other appurtenances and has a finished inside diameter of 17 feet. Its nominal capacity will be 700 million gallons daily.

Throughout its entire length, Tunnel No. 2 is 500 feet or more below sea level and it passes through bedrock in an area and at a depth heretofore unexplored.

Job to cost nearly $600 per linear foot

The construction of Tunnel No. 2 was divided into four contracts, all four of which were awarded to Patrick McGovern, Incorporated, in the total aggregate amount of $42,692,567.50. This is probably the largest contract ever awarded to a single contracting firm. Charles M. Clark, Department Engineer of the Board of Water Supply, was in active charge of work in the field for the Board.

The tunnel is 105,280 feet long and when completed with chambers, shafts, valves, various special equipment and the permanent superstructures, its total cost will be nearly $600 per linear foot—a total of about $60,000,000.

Principal items and their total estimated quantities are:

Item and Unit of Measurement	Total Estimated Contract Quantities
Excavation—cubic yards	
Shafts in earth	23,200
Shafts in rock	133,000
Tunnel, drifts, etc.	1,487,000
Open cut	136,800
Refilling and embanking—cu. yd.	237,000
Timber and lumber—1,000 ft. board measure	
Shafts and tunnel	1,200
Open cut	2,190
Forms for masonry—lin. ft.	125,120

Concrete masonry—cu. yd.	
Shafts and tunnel	642,000
Open cut	36,500
Cement—bbls.	1,537,000
Grout—cu. yd.	51,000
Steel sheet piling—lbs.	6,980,000
Steel interlining—lbs.	7,250,000
Reinforcing steel—lbs.	5,700,000
Structural steel and misc. steel—lbs.	14,544,500

Actual construction work was started March 19, 1929, and operations have been carried on 24 hours daily, Sundays and holidays excepted, through 17 vertical shafts by more than 2,500 men. The time agreed upon for the completion of the contracts varied from 67 to 70 months.

In general, the equipment provided for shaft sinking was the same at each shaft. Major items were 2 electrically driven air compressors; a stiff-leg derrick with 76-foot boom; air drills; 2 sinking pumps; a 1-yard gasoline-driven concrete mixer; 4 grouting machines (moved from shaft to shaft as required); an electrically driven blower with a capacity of 7,500 cubic feet per minute; 2 blacksmith oil forges operated by compressed air; 1 drill-steel sharpener operated by compressed air and a two-drum 100-horsepower electric hoist.

Digging the chambers and shafts

Chamber excavations at the upper ends of shafts were either wholly in earth or partly in earth and partly in rock. After completion they were supported with steel sheet piling and structural steel wales and braces. Where the earth cut was shallow, wood sheeting with timber wales and braces was used. A solid timber decking supported by heavy I-beams was laid over the chamber excavations at ground level after completion. This decking covered the hole completely except for a shaft opening.

Shaft excavations started from the bottoms of the chamber excavations. Five shafts started in the bedrock. The rest were started through earth, either as open supported excavations or by employing reinforced concrete caissons of 19 feet inside diameter, in which digging was carried on in an air-tight bottom chamber under pressure to exclude ground water.

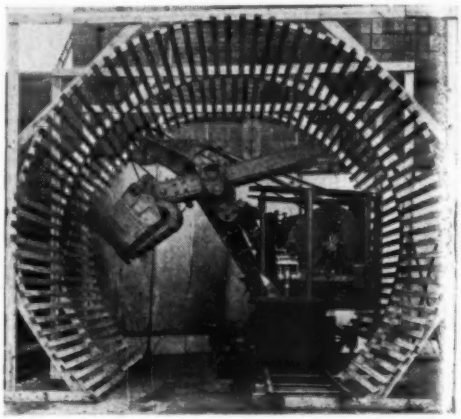
Typical steel head-frame over top of shaft and chamber. Hoist house on top of head-frame. Note the two "floors," ground level and muck dump. Section of the floor of muck chute is hinged so that it may be raised to allow shaft bucket to clear.

The caisson walls, when seated five feet in the solid rock, constituted the linings of the shafts where they passed through earth. All other portions of the shafts were lined by placing concrete behind circular forms. Water leakage into the shafts was cut off by pressure grouting.

Special air-operated tunnel shovels

Tunnel excavating equipment could not be safely installed until the tunnel headings and benches had

Sketch map of route of City Tunnel No. 2 from Hill View Reservoir in Yonkers to South Brooklyn. Drawn by the author from survey maps of the Board of Water Supply. City Tunnel No. 1 shown in dotted line.



These 1¼-yard Bucyrus-Erics carry a 11′ 5″ boom and 9′ 5″ handle. They operate by compressed air. The hoist machinery is mounted on the full revolving base carrying the boom. Swinging and propelling machinery is carried on a special car body carrying the air receive tank and air hoist for transferring empty cars. The revolving unit is mounted on a pintle on the front end of this car body. The test form surrounding the shovel is 19 feet in diameter. Modifications in the machine will permit work in an even smaller tunnel. This manufacturer makes a very complete line of tunnel shovels.

been dug 200 to 300 feet from the shaft bottoms. The shaft-sinking equipment was used for this preliminary tunnel digging.

The new tunnel equipment included two-story head-frames at shafts; shaft cages; electrically operated mine hoists; motor-generator sets; drills and columns; air-operated tunnel shovels; muck cars; storage battery locomotives; motor trucks; ventilating blowers and pumps. Elevated platforms were built at the shaft heads to support tracks for the muck cars and to hold the chutes for dumping muck into trucks. Steel buildings were erected on top of the head-frames to house the hoists and motor-generators.

Some occasional hand mucking was unavoidable in clearing the headings and the inverts, but practically all of the muck was handled mechanically. Twenty-seven air-operated Osgood and special Bucyrus-Erie tunnel shovels, all of 1¼-yard capacity, were installed for this purpose.

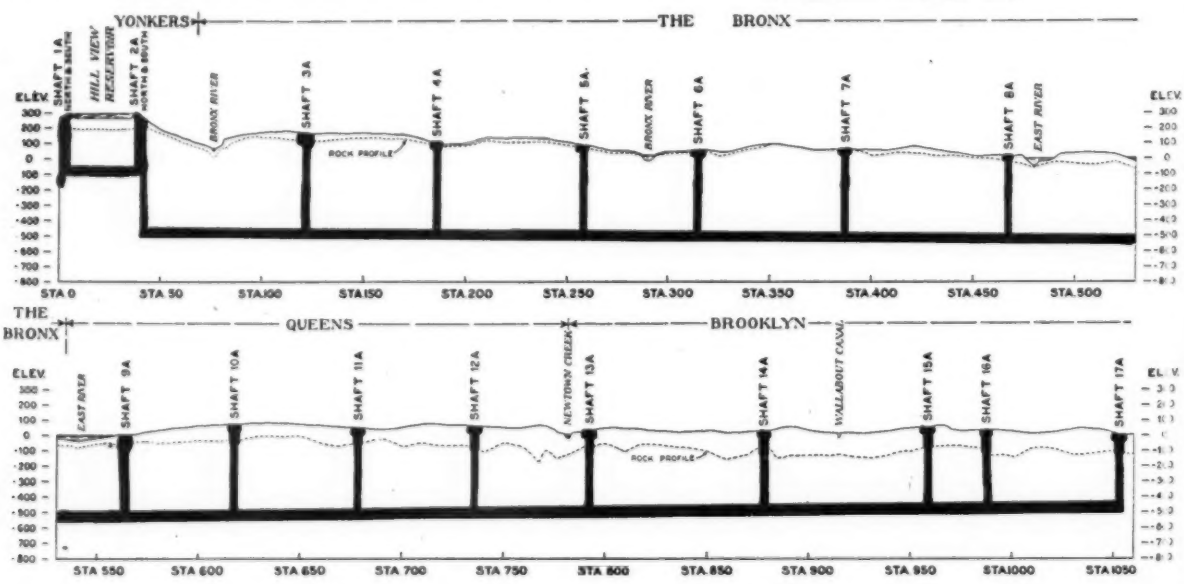
The special Bucyrus-Erie shovels were mounted on single trucks and loaded muck cars at the side and well to the rear. The digging units were full-revolving as by raising the bucket to clear the air storage tank they were able to swing the full circle. The Osgood shovels were modified small railroad-type shovels, mounted on double trucks with over 16 feet between king pins, and could only be used for loading at the side. The Osgood shovels and Bucyrus-Erie shovels were equipped with air-operated cranes at the rear to swing the muck cars from the shovel track to the parallel loading track.

In the excavation of the tunnel the top heading and bench method was used almost exclusively. The bench was kept as short as practicable to concentrate the muck so the shovels could handle it. Usually three advances were made at each shaft every working day, two in one heading and one in the other, as most bores ran both ways from the shaft bottoms.

While drilling was being done in one heading, mucking was ordinarily in process in the other. About eight hours were required to drill and shoot a complete round of holes in heading and bench and eight hours were required to clean up the muck after each shot.

Water was encountered in many of the headings and at some places geological conditions were encountered which were as difficult as the worst ever met in any tunnel. Pressure grouting at 300 to

(Continued on page 358)



Sketch profile of City Tunnel No. 2 from Hill View Reservoir in Yonkers to South Brooklyn. Profile divided into two sections of approximately ten miles each. Datum is sea level.

How State Highway Departments call bids for *cofferdams, sheeting* and *pumping* on bridge work

Question: On small bridge work, *is it the rule*, in setting down items upon which unit prices are multiplied out to get a total bid, TO INCLUDE the item "cofferdam, sheeting and pumping" *as a* SEPARATE *item*, or is this construction feature usually absorbed under the item of *structural excavation?*

In your opinion which is the fairest way to treat this matter?

Allow me to make this observation: owing to cutting bids so widely by all bidders, perhaps it would be best to always make this a *separate item*, so that the gross would more likely allow the contractor a margin.

The above question is not a legal one, but an engineering problem.

The legal point which may be raised covering cofferdam, sheeting, and pumping, involves the question as to whether the contractor may be paid for this separate item in the case he bid it in at a lump sum item, but actually used no cofferdam and did no pumping.

—VIRGIL A. EBERLY, *Bridge Engineer, Ohio Department of Highways.*

As the practice in taking bids including this item varies somewhat in different states our reader's inquiry was referred to the state highway departments of the various states. A summary of the replies received follows:

Answers

Arizona . . . . . included in the unit bid price a cubic yard for Structure Excavation . . . not a hardship on the contractors at least in this state where . . . problem is, with very few exceptions, a minor one. To separate or break up the items into small units or parts . . . with the idea that "the gross would more likely allow the contractor a margin", would, we believe, be of considerable help in eliminating the very unsatisfactory conditions due to price cutting.

J. S. MILLS,
Engineer of Specifications and Estimates.

Arkansas . . . . . payment for structural excavation covers all work incident to the building of cofferdams and cribs as well as sheeting and pumping. It would seem that it makes little difference whether or not this item is covered separately or in conjunction with the actual structural excavation if the specification covering the excavation adequately provides for the payment of the work involved.

W. W. ZASS,
Engineer of Construction.

Colorado . . . . . our practice is not to separate this from the bid for structural excavation. As most of our structures do not require very heavy cofferdam work we find this works out quite satisfactorily. However, in deep foundations, it might be well to separate this item.

J. E. MALONEY,
Assistant Engineer.

Connecticut . . . . Our specifications covering the payment of sheet piling are as follows:

"Payment for sheet piles shall include the cost of furnishing, driving and cutting off piles. Payment will be made only for that portion remaining in place and no allowance will be made for material cut off. Timber sheet piles will be paid for at the contract price per thousand feet, board measure, for "Timber Sheet Piling" in Place. Concrete sheet piles will be paid for at the contract price per cubic yard, including reinforcement, for "Concrete Sheet Piles in place. Steel sheet piles will be paid for at the contract price per pound for "Steel Sheet Piles" in place."

The payment for pumping is covered under the excavation for structures, either being placed under earth excavation, rock excavation or wet excavation, as the case may be. In the payment for wet excavation the specifications quote: "No additional payments will be made for bracing, shoring, pumping, bailing, or for material made necessary on account of water."

A. W. BUSHERE,
Engineer of Contracts and Construction.

Delaware . . . . . We do not, on our small bridges, include separate items "cofferdam, sheeting and pumping" as we require the contractor to visit the site of the job and determine whether these excesses of pumping and cofferdam will be made . . . Conditions . . . for . . . most bridges are not very severe and cofferdams are most frequently constructed of 2" material less than 8 feet long to run two to three feet below the bottom of the footing. Excessive pumping only results after abnormal rains.

Mr. Contractor . . . .

Tell us what you think is the fairest and most practical method of writing contracts on items of cofferdams, sheeting and pumping on bridge work.

Further discussion will appear in an early issue.

We have talked to some contractors and they . . . probably increase their price of excavation to cover the necessary cost for excavation of bridges.

My personal opinion is that all information probably should be placed before the contractor and that the job should be divided into as many items as to fully cover the different steps of construction. This procedure is followed in every case where we are constructing large bridges. It is either covered by the items of wet or dry excavation and considerable sums are spent in determining the class of material and its compactness by borings or small testings.

A. G. LIVINGSTON,
Bridge Engineer.

Georgia . . . . . It has been our practice to include in the price bid for excavation for structures all cofferdam and pumping work. We believe this the fairest practice, as some of the more experienced contractors are capable of building cofferdams at much lower cost than the contractors without experience. No two contractors would handle a cofferdam problem in exactly the same manner, and the cost of the cofferdam work and the amount of pumping will vary widely with the method of handling. If the engineers attempt to design the cofferdams or to direct the contractor in the construction of the cofferdams it discourages ingenuity on the part of the contractor and his superintendents. It also places an unnecessary burden on the Engineering staff in charge of the work.

If the cofferdam work was included as a separate item the state must of necessity specify some type of cofferdam which would be the minimum requirements. This would lead to design of the cofferdams by the State, and the assumption of responsibility for a part of the work which can probably be better worked out by the contractors.

SEARCY B. SLACK,
Bridge Engineer.

Illinois . . . . . In some states it is the practice to provide separate pay items for these construction operations. In Illinois, however, the practice is to include these operations in the pay item for concrete masonry.

G. F. BURCH,
Bridge Engineer.

Indiana . . . . . It is our practice in our smaller bridge contracts to include the items of cofferdams, sheeting, pumping and so forth as a part of the item for foundation excavation. We have paid for cofferdams separately as a lump sum in some of our larger contracts. It is my impression from our experience in these larger structures, that the use of cofferdams, and so forth as a separate item results in general, in higher and more erratic bidding. It is very difficult, however, to analyze the data on this subject and reach any satisfactory conclusion.

FRED KELLAM,
Assistant Chief Engineer
in Charge of Structures.

Iowa . . . . . no separate bids are received on excavation and pumping in connection with our bridge and culvert construction work. It has always been our custom in this state to receive bids on the structure complete rather than on the unit basis, as is commonly done in many of the states.

C. COYKENDALL,
Administration
Engineer.

Kentucky . . . . . the specifications provide that the bid price for structure excavation shall be full compensation for all work, including unwatering holes, placing cribs, cofferdams, caisson, and all materials, equipment, labor, tools and incidentals necessary to complete the work. It is not thought necessary to have a separate bid item for cofferdams, sheeting and pumping, as these items are of necessity to be considered in arriving at a price for structure excavation and the necessity for a separate bid item of this nature is not seen.

BEN JOHNSON,
Chairman.

Maine . . . . . in regard to considering the item of cofferdam, sheeting and pumping as a separate item, will say that in all bridge construction in this State, this is done. In our road contracts, the contractor has small culverts. There is so little of that item it is not believed advisable to attempt to separate it, so we include it under the item of Excavation for Structures.

R. M. PAGE,
Office Engineer.

Massachusetts . . . on small bridge work and usually on large bridge work it is the practice in this State to include the item "cofferdam, sheeting and pumping" as a part of the cost of the construction of the structure, excavation and masonry construction. When any sheeting is to be left in place, it is a practice to have a special item covering sheeting left in place. In my opinion the fairest way to treat this matter is as is done in this State as previous investigation before the contract was let shows quite definitely to the contractor what the expense is going to be and he can absorb it in whatever items he sees fit.

A. W. DEAN,
Chief Engineer.

Michigan . . . . . Our practice in paying for excavation is to require that the cofferdams be considered as included in the cost of substructure concrete. We pay for wet and dry excavation within the cofferdam to a minimum outline of 18 inches outside of the footings. It is quite evident that the purpose of the cofferdam is to place substructure concrete. It is also evident that if we are to pay for a cofferdam as cofferdam we must then specify the detail of the cofferdam to such an extent as to insure that we get our money's worth, otherwise the practice of the contractors would be so variable that the control of our work would be lost.

In the event of any change in elevation of footings, the cofferdam costs are not proportional to the increased excavation in concrete quantities but, rather, the cofferdam in the first instance must be designed to permit a reasonable deepening of footings of 3 or 4 feet and, likewise, a widening of footing to correspond. It is for this reason we require the 18 inch clearance. This also permits room for sumps outside of our footings.

By placing this cofferdam item as included in the cost of concrete work in the substructure we feel that we have the most satisfactory arrangement practicable. We likewise specify the height of the cofferdams sufficient to extend one foot above the mean between high and normal water and to extend to such a depth as to permit toeing in even under the extreme of a 4 foot deepening of foundations.

C. A. MELICK,
Bridge Engineer.

Minnesota . . . . it is the practice of our Department in awarding contracts for this class of work (small bridge jobs) to make awards on the basis of lump sum bids. . . . Our proposal blanks list the main quantity items involved in a bridge job, such as concrete (cubic yards) Grade "A", "B" or "C"; reinforcing steel (in pounds); structural steel (in pounds); pipe railing (in pounds), piling per lineal foot and so forth. These quantities comprise the major items entering into a bridge job, but we make no attempt to list the amount of excavation (dry or wet), waterproofing, bituminous felt, and so forth.

Our plans clearly call for all the miscellaneous materials required for the completion of the job, and the lump sum bid as submitted for the new structure covers the job complete. In addition our Department also calls for proposals covering the furnishing and maintenance of the temporary crossing as well as an item for removal of old bridge. Our proposal blank also makes provision for a schedule of unit prices covering increased or decreased items of work, and these prices govern slight changes which may arise during actual construction work. Our specifications provide that in case there is an increase or decrease in the amount of 20% covering any item of the job, that an adjustment is to be made without any reference to the increase or decrease in unit prices, unless it is mutually agreed that such prices are satisfactory.

In the case of large jobs where there is some likelihood of change, we have been modifying our practice so as to call for unit price bids on the various items of work, but we have never seen fit to cover an item for cofferdams, sheeting and pumping. This item of work appears to be influenced primarily by the particular idea of the contractor concerned, as well as the equipment which he has available at the

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Cars are spotted at the shovel with an electric winch and cable.

Filling underground coal workings in Borneo

Paketvaart Maatschappij use 1 1/4 yard steam shovel to load slate and sandstone for filling old corridors in coal mine.

PAKETVAART MAATSCHAPPIJ operate extensive underground coal mines in Parapattan, Borneo. To provide material to fill up the old corridors in the mines they operate a Bucyrus-Erie 41-B steam shovel.

The shovel is cut into a hill which provides a working face about 100 meters (328 feet) long and about 20 meters (65.6 feet) high. The material is a mixture of slate and sandstone, the strata being tipped at an angle of about 45 degrees. The rock is drilled to a depth of about one meter (3.28 feet) and shot. The shovel loads to empty coal cars which are spotted as required at the shovel after coal has been unloaded. These are handled to and from the loading track in trains of 20 cars each hauled by electric locomotives. As the cars are brought up to the working face they are taken over by an electric winch which spots them with a cable alongside the shovel. The locomotive takes over a train of loads and goes back to the mine.

Everything that is loose is excavated. At points where the hill is too high for safe loading with the shovel in a single cut the excess height of bank is thrown down by hand or with dynamite. When the drill gang is shooting at one end of the face the shovel operates at the other end avoiding delay for blasting and danger of damage by dropping stones. The ready mobility of this machine with its caterpillar type mountings is of distinct advantage in enabling it to dig at any point on the working face with very little delay for moving.

20 Cars Usually Loaded in 14 Minutes

The contents of the dipper is a little larger than that of the cars, which is 750 litre, (about one

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One dipperfull fills a car. Note teeth marks in the bank.

Dynamite and Dredges Remove Bridge Piers

The Dravo Contracting Company encounters unique blasting problem in demolishing masonry and reinforced concrete.

4,160 pounds of du Pont takes this masonry pier for a ride

AN INTERESTING example of the use of explosives in demolition work was the recent destruction of masonry and reinforced concrete railroad bridge piers, located midstream of the Delaware River at a point about two miles below Trenton, New Jersey, by The Dravo Contracting Company of Pittsburgh. The group included a pivot pier and two fender piers to support the draw span of a projected steel bridge. They were constructed by the P. R. R. in 1915, but the bridge was never built. The removal of the piers was ordered by the War Department to permit the deepening of the upper Delaware to a depth of 35 feet at mean low water.

The pivot pier was hexagonal in shape and tapered to sides 30 feet, two inches at the top for an elevation of 38 feet, 5½ inches from a wider base, the total elevation being approximately 80 feet from the bottom of the pier foundation below the river bed.

Prior to the main blast, about 30 feet of masonry were removed by jackhammer drills with small holes and small charges, cutting down the pier to an elevation slightly above the normal high tide level.

A Loomis Clipper well-drill machine was then placed on the piers and 5⅝-inch holes for the main charges drilled. The south fender pier had 12 holes. This pier was approximately 32x43 feet and the holes were 39 feet deep. The second or pivot pier was hexagonal, about 30 feet on each side of the hexagon. There were 19 holes drilled in this pier, each hole about 45 feet deep. The north fender pier, the same size as the south, has 14 holes instead of 12.

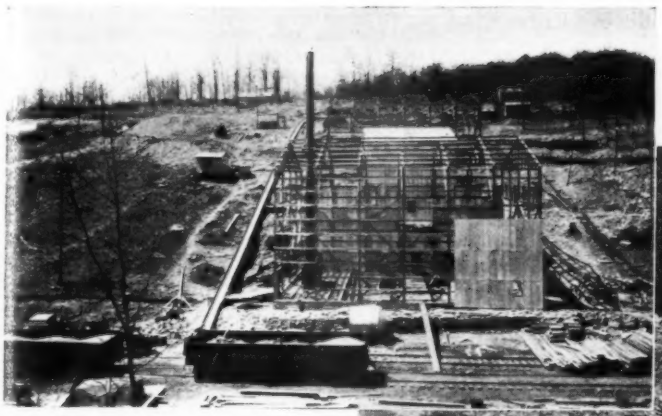
The loading system for the main blast in the pivot pier included a center hole, 6 holes in a circle of 10 feet radius, and 12 staggered holes with an extreme radius of 20 feet. The du Pont special gelatin dynamite loaded in the bottom of each hole was 75 per cent strength, while the balance was 60 per cent. All cartridges were 4½x16 inches. A charge of 230 pounds was loaded in each of the 6 holes of the inner circle, while charges of 210 pounds were used in the staggered holes. The center hole was loaded with 260 pounds of explosives and tamped with 8 feet of sand. With the exception of that for the center hole, the charges were divided by means of tamping. In loading the holes on the 10-foot radius, 180 pounds of gelatin were tamped with 16 inches of sand, 30 pounds with 3 feet, and 20 pounds with 8 feet. The outer, or staggered holes, contained 150 pounds of gelatin, with 4 feet of sand, 30 pounds with 3 feet of sand, 30 pounds with 8 feet of sand. The heaviest loadings were in the bottoms of the holes.

Similar loads were used in the fender piers. The method of firing was a single series connection of all the holes with cordeau which, as probably most of our readers know, consists of a lead tube of small diameter filled with an explosive compound which has a velocity of detonation of about 17,000 feet per second, and is detonated with blasting caps.

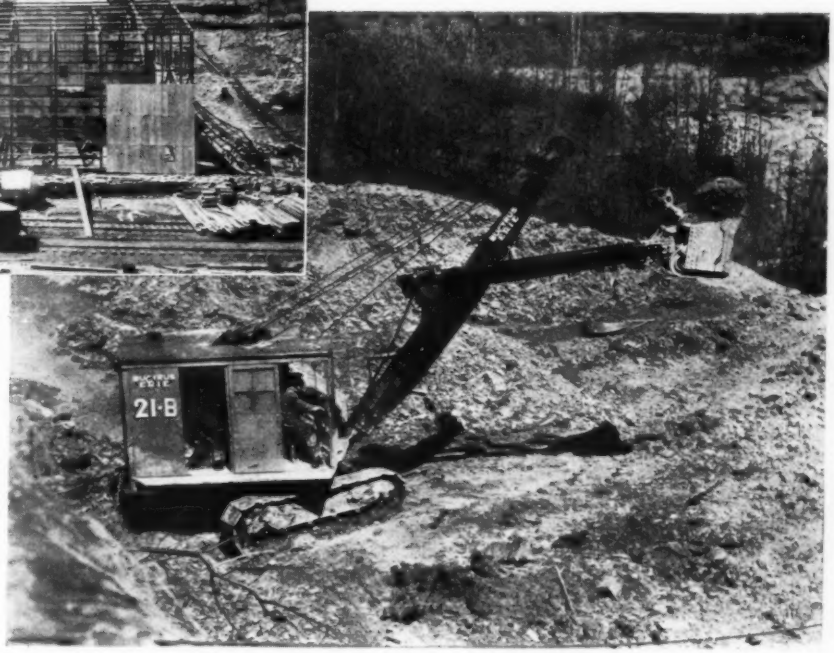
Following the demolition of the piers, whirler boats were put to work removing the debris from the river.

E. E. Weeter superintended the job for The Dravo Contracting Company, Pittsburgh, Pennsylvania, and was assisted in the blasting by Samuel R. Russell, of the Technical Section, Explosives Department, E. I. du Pont de Nemours & Company. The demolition described above is being carried on by The Dravo Contracting Company under contract with the Pennsylvania Railroad Co., under supervision of A. C. Watson, Chief Eng., New York Zone.

Tavern Rock Sand opens new plant



Left: The new plant nicely started. Below: Here is rather an unusual combination. In stripping the 21-B digs the material out of the bank and casts it to the side from whence it is moved to the dumping location with a drag scraper using a Sauerman bucket.



Excavation for plant buildings, stripping and mining handled by Bucyrus-Erie 21-B shovel

THE Tavern Rock Sand Company recently purchased 275 acres of land at Enterprise, Kentucky, which has a deposit of silica sandstone underlying it, of a thickness of about 30 feet. This company is a subsidiary of the Owens-Illinois Glass Company.

There is some tough scratching in this stripping operation but the 21-B carves heaping dipperfulls out of the bank without difficulty.

The Tavern Rock Sand Company is using a Bucyrus-Erie 21-B ¾-yard shovel for stripping the overburden from this deposit and for mining sandstone. The shovel was also used in excavating for foundations for the different plant buildings.

The overburden is hauled to the dump with a drag scraper using Sauerman buckets. Sanford-Day drop-bottom cars handled by a three-ton Plymouth locomotive will haul the stone from the quarry to the crushing plant. The stone is drilled with S-49 Ingersoll-Rand drills and compressors. The drill steel is sharpened on a No. 34 Ingersoll-Rand sharpener. Blasting is with Burton explosives.

Production to be 200,000 tons silica sand yearly

After the stone is loaded to the Westerns by the 21-B it is hauled to the crushing plant, which consists of two Jeffrey hammer mills. It is then car-

ried, by a belt conveyor, to a large special made revolving screen, which takes out all oversize. This oversize then returns to one of the hammer mills for recrushing. The small size is passed from the different bins, by the means of other belt conveyors to special constructed sand tables, where the impurities are taken from the glass sand. This sized material is then dropped into special bins for storage.

The new plant has been designed to produce 200,000 tons per year, part of which will go to the plant of the Owens-Illinois Glass Company at Huntington, West Virginia. The balance will be for outside sale.

The Tavern Rock Sand Company also operates similar plants at Klondike, Missouri, and Millville, New Jersey. Vice-President T. A. Graham is in charge of all production and G. A. Saulsbury is the Superintendent in charge of the plant at Enterprise.

Reclaiming Waste Land in Northern Indiana

SAND, quicksand, muck, and timber forests formed the daily diet for the two Diesel draglines owned by Contractors Reder and Seed of Goodland, Indiana, on their recent drainage ditch job in Newton County, Indiana.

Approximately forty-four miles of ditches ranging in depth from six to twenty-six feet were dug by these Bucyrus-Erie draglines using 45-foot booms, 1¼-cubic-yard drag buckets and Atlas Imperial engines. This 44-mile addition of ditches forms an important connection to the drainage system in the northern part of the county.

Subcontracting under Reder and Seed were Robert Stubblefield, Indianola, Illinois, with his Bucyrus-Erie D-2 Diesel dragline and W. Loyt Simmons, Mason City, Illinois, with his Type 1035 Bucyrus-Erie gasoline dragline.

There were 44 miles of ditches in Newton County running from 6 to 26 feet in depth. The excavation totaled 400,000 yards and was completed in 200 days. Below is one of Reder & Seed's Diesel draglines. Operator Skinner is shown beside the lever stand with his oiler. On the ground is Contractor W. J. Reder.

Most of the ditches were dug through a real frontier country much of which has never been cultivated. The location of the operations made it a difficult matter to bring in the ordinary supplies and materials. Adverse working conditions conspired to delay progress on the job. However, these capable men with their dependable machines which, they report, performed in a highly satisfactory manner, moved over 400,000 yards in approximately 200 working days of 8-hour shifts.

Outputs ran as high as 1,200 cubic yards per shift for the Reder & Seed 1¼-yard D-2 machines totaling 309,000 cubic yards. Robert Stubblefield's 1¼-yard D-2 moved 60,000 cubic yards and Loyt Simmon's 1-yard Type 1035 handled 31,000 cubic yards.

FIELD NOTES

Trenching River Crossings with Dynamite

IN PIPE LINE construction, when crossing streams of any size, it is frequently necessary to bury the line from two to five feet below the natural river bed. If this is not done, debris floating down stream is likely to attach itself to the pipe with disastrous consequences. It has been common practice to dredge or use other equipment to excavate these trench-crossings, lay the pipe in them, then let the river sediment fill up the excavation.

A simpler, quicker and usually less expensive way is reported in a recent issue of *The DuPont Magazine* by A. L. Nixon, of San Antonio, based on experience with 54 successful river crossing shots from 50 feet to 3,600 feet in length, eight of these being on the Trinity River. These typical shots were made for Fredell Construction Company of Amarillo, Texas (1 shot in 18 feet of water for 5-foot trench); Mitchell Stewart Construction Company, Dallas (2 shots in 17 feet of water, 5-foot trench); Magnolia Pipe Line Company, Dallas (1 shot in 15 feet of water, 4-foot trench); Texas Construction Company, Houston (2 shots in 12 feet of water, 5-foot trench, and 2 shots in 18 feet of water, 6-foot trench).

Each crossing presents its own problems and in solving them some unique blasting practices have been employed.

The Trinity River is less than 200 feet wide, but, in some places, it is more than thirty feet deep and the water is so discolored that one cannot see the river bottom. Before attempting to use dynamite, the men had to know what materials would be encountered. They probed the bottom along the entire right-of-way and found hundreds of "deadheads" and snags deeply imbedded in the mud, as

well as rocks and other obstructions. First, these rocks were drilled and shot. Then bombs, made up of bundles of dynamite, were placed and shot to dislodge the water-soaked stumps and logs; and finally came the task of shooting the trench. A special plan was developed to meet these deep-water conditions. For lack of a better name it has been called the "string-shot" method.

Briefly, this involves stretching a cable across the river directly over the line of the proposed trench. To this cable bundles of dynamite are attached, end to end; and at intervals of every few feet small boulders are also tied on for additional weight, so that when the "string of dynamite" is prepared, it can be lowered straight down to the desired position in the river bed, without being deflected by the current. This accomplished, the shot is fired with the result that a trench of sufficient size is excavated and the pipe is easily and quickly placed in it by means of a tractor and cable.

Loads used on the Trinity River shots varied, running from five to ten sticks of DuPont 50 per cent ditching dynamite per bundle, depending on depth of water, size and kind of material in the

river bed. Only one electric blasting cap is placed in the shot, this being inserted into one of the sticks on either end of the string. When the shot is fired it sets off the bundle that it is connected to and the wave of detonation then passes to the next bundle, and to the next, until the entire string is set off all the way across. The effect is simultaneous and looks as though an electric cap had been placed in every bundle and every bundle set off at the same time. In preparing this kind of a shot the depth of the water, size of desired trench and kind of material to be blasted on the river bed should all be taken into consideration.

Handy Home Made Adjustable Oil Can Spout End

EXCELLENT adjustable oil can spouts are made for getting oil into holes and places where the straight spout cannot be easily handled or used at all. However some of them are none too handy, and convenient at that. A simple and practical substitute in a pinch is shown here. The end of a long common inexpensive hydrometer tip was cut off and forced over the tip of the straight spout. The hole in thru the rubber tube is small and does not let too much oil thru, and it can be bent and held in any position. It is readily pulled off and laid away when not in use. Easily removable, absolutely non-breakable, and can be worked into any place or position.

—Frank W. Bentley, Jr.

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The Business Situation

AS AT THE END of every other major depression and during the first weeks of the upturn, we today find unusual and unwarranted pessimism holding uncontrolled sway in the mind of the average business man. The mental situation is the exact antithesis of the optimism and over-confidence that ran riot in the years of '28 and '29 and reached their crowning glory in the fall of 1929, when the factors which promised deflation finally came to a head and precipitated the present depression.

Approximately two-thirds of the former major depressions have started their up-swings during the summer months—June, July or August—and most of them have started upward at a fairly rapid rate. Both of these facts tend to brand as unnecessary at least part of the fear for the winter of unprecedented hardship which so many persons have been predicting for us.

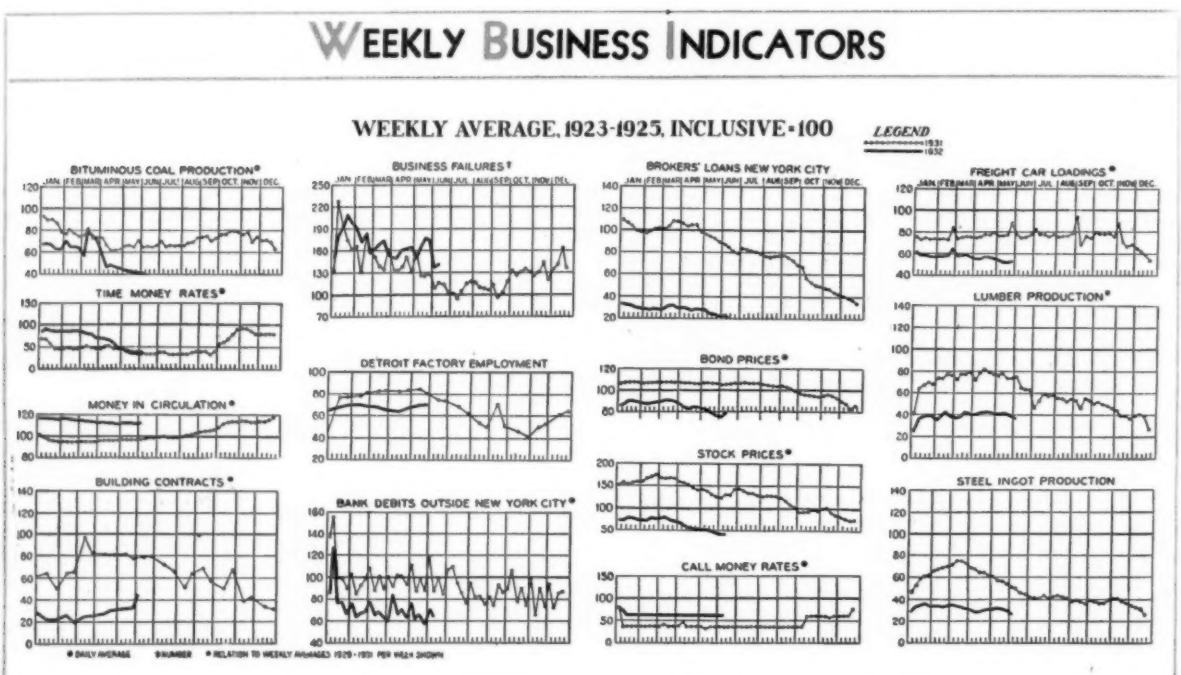
Election years have been both good and bad, like any other year in the four which comprise our presidential cycle. There is no sound reason why Mr. Average Business Man should consider himself "clutched in the iron claws of fate" just because of the fact that our voters go to the polls on November 8th.

We have been through a credit deflation which most certainly strained the resources and ingenuity of our country but we have, most certainly, come through with unusual success. Just what this crisis amounted to, can be best shown briefly by pointing out that between the end of June, 1931, and February, 1932, a combination of two factors brought about a reduction of credit among the Federal Reserve member banks which amounted to $1,384,000,000. These two factors were:

First, the withdrawal of saving deposits by persons throughout the country who had become alarmed at the number of bank failures. This withdrawal made it necessary for the banks to make further borrowings at the Federal Reserve Banks and seriously curtailed their own business of lending money. This curtailing of bank loans aggravated the situation still further. The increase in currency in circulation (the increase in currency necessary to meet the needs of the public) amounted to approximately $782,000,000. With business at a low ebb it is obvious that a great portion of this currency left the banks only to be hidden away throughout the country by those who had lost faith in the country's ability to come back. Thus it is obvious that this figure represents a decrease in the currency available to carry on business.

The other factor which brought about our credit crisis was the withdrawal of gold from the United States by foreign countries. Contrary to the popular belief, the people of the United States import immense quantities of raw materials from other countries. This means that it is comparatively easy for certain other nations to withdraw gold from our country, when, as and if they become worried about our financial condition. History shows that

WEEKLY BUSINESS INDICATORS



any country with an improperly balanced budget experiences a severe loss of gold during a period of business recession. During the period mentioned above, $602,000,000 in gold was withdrawn from this country.

And now let us see how this crises has been met. In the first place, since psychology is as important a factor at the present moment as any other, it is interesting to note that the total money in circulation has decreased almost uniformly during the months of February, March, April and May. In other words the hoarded money is being brought out into the open again. The Glass-Steagell bill which gave the reserve banks power to use Government securities as collateral for Federal Reserve note issues, permitted them to buy Government securities on the market with currency which upon being deposited in the banks by the sellers of the Government securities has created the basis for an extensive addition to available credit.

The operations of the Reconstruction Finance Corporation have restored confidence.

In the meantime we have exported virtually all of the gold that can be withdrawn from this country and although it amounted to over $200,000,000 the readjustment was brought about without seriously disrupting our financial structure.

In fact during this period there has been a net increase of $280,000,000 in the volume of member bank reserve balances available for use as a basis of credit. It should be remembered that this amount of money at the customary ratio of credit to reserve might be made responsible for over $3,000,000,000 of additional member bank credit without any further expansion on the part of the reserve banks.

While the banker must continue to use careful judgment in the placing of loans—for he still must reckon with the owner of the funds he handles—there are ample funds available for use as the element of fear is gradually eliminated.

In the charts of business indicators attached to this article it will be noted that building contracts have shown an upward trend during the first part of June. This upward turn is, to be sure, somewhat belated. It is somewhat more than the seasonal variation at this point of the normal curve.

Bond prices have apparently responded to the action of New York bankers of forming a large investment trust to stabilize bond prices.

As this is being written, stock prices are showing a tendency to become more firm after their latest price descent.

The chart for Detroit factory employment, which reflects the activity in the automobile manufacturing industry, shows an increase in volume during the month of May. This rise represents a belated increase in volume which was apparently brought about by the automobile purchasing public waiting to see the new Ford cars before buying.

Correcting an Error

ON PAGE 191 of the April issue in mentioning the electrical equipment used on a Bucyrus-Erie Class 230 Diesel-Electric dragline owned by Brooks-Calloway Company, Inc., we erred in giving the name of the manufacturer. This electric equipment was manufactured by Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, to whom we are indebted for calling this error to our attention. Thank you.

Filling underground coal workings in Borneo

(Continued from page 335)

Coal is taken on the fly.

cubic yard) so that one dipperful is just sufficient to fill a car, the extra contents of the dipper equalizing the material that is left in it when damp, or that is dropped at the side of the car.

When there is sufficient spoil, and the spoil is dry, the shovel fills a car in 40 seconds. A train of 20 cars is filled in 14 minutes, the spotting of the train being done while the shovel is filling the dipper. When the shovel has heavy digging it takes a little longer, the loading of a car requiring 50 seconds.

The capacity of the shovel, under these circumstances, depends on the number of cars that are furnished and the type of digging available. Under the existing conditions the shovel will fill in 8 hours 400 to 500 cars which is sufficient for the requirements.

The owners report that the shovel manipulates clay and soft stone very easily. Up to now, no repairs have been necessary, although the machine has been in service several years. The management reports: "The machine is very robust and strongly constructed and will stand heavy work."

Natives Make Successful Operators

The machine is manipulated by ordinary natives, who can work very cleverly with the machine. Apart from the operator there is the foreman and in case a larger capacity is wanted a koelie is furnished to trip the dipper. When working on low capacity the operator himself pulls the latch rope.

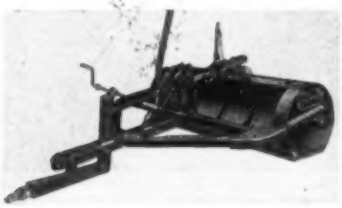
The Johnson boiler is fed with distilled water with the result that no incrustation is formed. As to keeping steam, it keeps steam without the slightest trouble according to the report of Paketvaart Maatschappij.

EQUIPMENT YOU OUGHT TO KNOW ABOUT

Automatic Roll-Over Scrapers Made by LaPlant-Choate

THERE has been recently acquired the license to manufacture Automatic Roll-Over Scrapers under the Reynolds patents No. 1642826 and No. 183339, by *LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa.*

These scrapers are built in five sizes with the following capacities: 18, 22, 27 (shown in the accompanying illustration), 42 and 56 cubic feet for use with models Fifteen, Twenty-Five, Thirty-Five, Fifty and Sixty-Five "Caterpillar" tractors, respectively.



Of these scrapers the manufacturer says "They excel all others because of their greater strength, their simplicity of design, their lighter draft, their longer life, and their ability to perform tasks not possible for other scrapers." Complete information and specifications may be had by writing the manufacturer. Please mention *Excavating Engineer.*

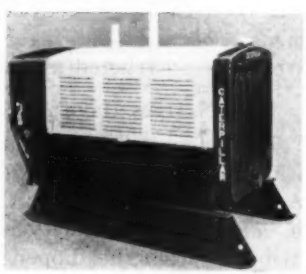
New "Power Saver" Electrode Holder Stand

A NEW electrode holder stand which automatically shuts down the welder 1 minute after holder is placed on stand and instantly starts the welder when holder is removed, is announced by *The Lincoln Electric Company of Cleveland,* makers of "Linc-Weld" motors and "Stable Arc" welders.

It is claimed that the automatic start-and-stop feature of the new stand effects a decided saving in power consumption. Heretofore it has been common practice to let the welder run continuously during working hours even though the operator may actually be welding intermittently throughout the day. If further information is desired, the manufacturer will be pleased to have your inquiry.

"Caterpillar" Engines on Market

THE Caterpillar Tractor Company is offering a line of its proven tractor motors that have been adapted for stationary and industrial power uses. These engines, according to the manufacturer, are of the "heavy duty" type, weighing more per horsepower than most other engines. This means more and better materials to endure the power loads and abuses to which all engines are subjected, resulting in longer life, less interruptions to the operation, and fewer repairs.



Heading the list of engines adapted for stationary and industrial use is the Diesel engine. Next is the Sixty-Five. Then come the Fifty, Thirty-Five and Twenty-Five engines, very closely resembling each other in design, construction and relative performance. Complete specifications and other data may be had by writing the manufacturer at *Peoria, Illinois.* Please mention *Excavating Engineer.*

New Type Blaw-Knox (Ateco) Bulldozer

MADE for attachment to all sizes of tractors, the Blaw-Knox (Ateco) Hydraulic Bulldozer has distinctly unusual design features, according to Blaw-Knox Company, the manufacturer. The power is hidden in the operating mechanism, being enclosed in the side arms, fully protected from dust and dirt — reducing maintenance cost and preventing breakdowns. Its compact box type of construction allows the blades to work within close limits of the tractor. No part of the frame work extends beyond the rear of the tractor, the drawbar being left free and clear for the attachment of other equipment. The simplicity of this design and absence of frame work gives great accessibility to the tractor mechanism and maximum visibility to the operator.

The bulldozer is controlled through the action of a double acting Ateco hydraulic pump. A bypass safety valve in the piston allows the bowl to lift if it encounters large bowlders or other immovable obstruction, saving breakage, distortion and repairs.

The bulldozer bowl is curved, designed to lift and roll dirt, greatly reducing resistance to pushing. The cutting edge is made of alloy steel to give the greatest possible resistance to abrasion and to retain its sharp cutting edge. The bowl is electrically welded, heavily reinforced, supported by two side arms and attached to tractor truck frame. Complete information may be had by writing *Blaw-Knox Company, Blawnox, Pennsylvania.*

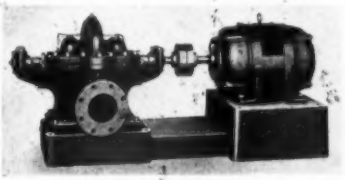
New Tractor-Mounted Welder

A RECENT development in welding machines has been announced by *Schramm Inc.,* of *West Chester, Pennsylvania.* This new welder is of a type that can be mounted on the framework of any standard make of tractor and operated by "V" belt drive from the rear power take-off. The welder is located alongside the driver's seat on a removable sliding frame. Control panel is on the side opposite from welding unit.

This unit is a single arc, variable voltage design. Sizes, for mounting on tractors of sufficient H. P. rating, include 200, 300, 400 and 600 amperes. It will travel the roughest ground and the welder mounting does not affect the pulling or towing feature of the tractor drawbar. The manufacturer will be pleased to send additional data on this new

welder upon request. Please mention *Excavating Engineer* when writing.

New Centrifugal Pump Added to Fairbanks-Morse Line



DESIGNED as a general purpose pump, the new Fig. 5803 centrifugal pump recently announced by Fairbanks-Morse & Co., marks a peak in the field of centrifugal pump design both from the standpoint of hydraulic performance and mechanical construction, according to the manufacturer. It is a split-case model, perfected as the result of a vast amount of experimental and field research over a period of several years.

It is built in five sizes from 3-inch to 6-inch with capacities as follows:

Size	3-in.	4-in.	5-in.	6-in.	6-in.
Minimum Capacity	250	450	650	1000	1200
Maximum Head at Minimum Capacity	180	180	180	180	180
Normal Capacity	390	550	850	1300	1500
Maximum Head at Normal Capacity	165	165	165	165	165
Maximum Capacity	450	650	1100	1650	1800
Maximum Head at Maximum Capacity	140	140	140	140	140

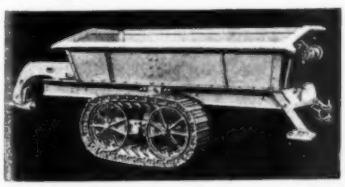
The principal feature of this pump is the resistance to wear. Among the construction features tending to this end are: the double wearing rings; the design of the volute to produce steam line flow with the consequent reduction in cavitation and, hence, pitting; the ball bearing support for the shaft and the brass liner on the shaft. The pump is driven by a ball-bearing motor made and backed by the same manufacturer. Additional information on this new pump may be had by writing *Fairbanks-Morse & Co., 900 South Wabash Ave., Chicago, Ill.*

Athey Announces New Crawler Wagon

A NEW CRAWLER WAGON has just been announced by our client. the *Athey Truss Wheel Company, 130 North Wells St., Chicago, Illinois.* This wagon is known as the "Forged-Trak" Bottom Dump Trailer.

Its design incorporates every desirable and practical mechanical feature.

Features claimed for it by the manufacturer are many. It has a one-piece box section arch drawbar, with an adjustable and reversible spring mounted, spring cushioned, swivel type tractor hitch. The track assembly has an interlocking self-cleaning structure. It has drop forged track links, having integral interlocking arms. The track pin bearing is of the pin and bushing type so successfully used in tractor track construction. Pin is alloy steel heat-treated. Bushing is carburized. Link is counter-bored to receive bushing, forming seal against entrance of foreign matter.



Four sizes of bottom dump trailers are included in this series of 5, 6, 7 and 8-yard capacities.

The body is of ¼-inch high carbon steel plate, well braced and reinforced. Extension sides are furnished on the 6 and 8-yard units. The front and rear ends have a modified taper and rounded corners; this with counter-sunk rivets provides a self-cleaning body.

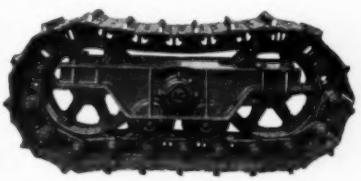
The full length doors are of ⅜-inch high carbon steel plate, reinforced with bulb angles. The hinges are of cast steel with heat-treated steel pins.

The axle brackets are heavy box section steel castings with heat-treated stubs and stub axles. The axle is of tubular section. Each axle bracket is secured to side sill by six large heat-treated alloy steel bolts. Stub axles are secured in bracket by bolts and are quickly replaceable.

The adjustable and reversible spring mounted, spring cushioned, swivel type tractor hitch has a heat-treated drop forged alloy steel coupling, and all bearings of the assembly are equipped with replaceable hardened steel bushings. This hitch assembly is reversible for direct connection to either tractor or trailer. This unit cushions loading and roading shocks on tractor and trailers. Complete specifications may be had by writing the manufacturer.

Allis-Chalmers Wagon Tracks

A WAGON TRACK designed to fit any make of track wagon, new or old, has been announced by the *Tractor Division* of *Allis-Chalmers Manufacturing Co., Milwaukee.* Design, materials and workmanship of the new track are said to be the same as those used in Allis-Chalmers track-type tractors. Some of the features claimed for it are ease of pulling, the fact that it is self-cleaning, use of materials which are constantly tested, and low price.



A four-point support is provided for each track by two end wheels and two truck wheels. The load is moved easily with minimum power because it is moved over the tracks like railway truck wheels rolling on rails. The track shoes, designed especially for wagon use, are made of heavy pressed steel. Links are drop-forged and heat-treated to assure hardness and toughness. Pins and bushings are case-hardened and so designed that natural wear does not affect the ease of pulling.

A strong one-piece frame supports the truck, track wheels and two end wheels. This frame is made up of welded steel plates rigidly braced by steel ribs which are welded on at points where the stress is greatest. This results in a construction practically unbreakable. The track unit is mounted midway between the end wheels and truck wheels, and is free to pivot about the axles. A tube is welded into the side plates of the frame. It is fitted with bushings of various lengths and diameters, simplifying installation on wagons of various makes. Truck wheels and end wheels are mounted on roller bearings having spring compensating cork seals to keep the oil in and the dirt out. These wagon tracks and parts are stocked by Allis-Chalmers track-type tractor dealers. When writing for additional information please mention *Excavating Engineer.*

A NEW DUMP CAR

New Opportunities For Cost Reduction with WESTERN END DUMP CARS

This new 20-yard end dump car has many uses to which no other equipment is so well adapted. It is of the drop door type, air operated, and built to handle the heaviest material to be encountered in strip mining and construction work.

Used at the end of your side dump train, you can raise and extend fills without the expense of building trestles; you can keep your dumps "squared up" and economize space. At the same time, the end dump car will be handling its full share of the load.

Used as an independent hauling unit, it is invaluable for stockpiling.

There are many economies which this new end dump Western can effect on your job. Let's talk them over. Write today.

WESTERN WHEELED SCRAPER COMPANY
Pioneer Builders of Dump Cars
AURORA, ILLINOIS, U. S. A.

WESTERN

For your convenience in writing to Western Wheeled Scraper Company, you will find a card bound in this issue.

SHOTS FROM THE FIRING LINE

Roadbuilding Program Will Encourage Business

BEGINNING a program of public works with increased roadbuilding as an essential part will serve as a "spark plug" to start business activities on the up-grade through the attendant stimulation of public buying. This belief was expressed by T. H. Cutler, president of the American Road Builders' Association, in discussing present business needs.

"Business recovery is dependent on the general resumption of trade which will come about most quickly through increasing the purchasing power of the general public," Mr. Cutler declared. "With ten million people unemployed, according to newspaper reports, and a general curtailment of spending through fear of further losses or plain lack of money, a bold move is needed to start things off. Otherwise, if renewed business activity is left to some chance happening, the turn for the better may be postponed for an indefinite period.

"Public works construction, especially highway building, offers the brightest promise of an immediate stimulation of business without a counterbalancing production of goods and commodities for a market that appears to be glutted, as judged by commodity prices.

"The public works program recommended by the American Society of Civil Engineers is based on average estimates for the last six years which show a comparatively constant volume of public construction amounting to three billion dollars annually. Present indications, according to the society, are that in 1932 public construction will not exceed one and one-half billions, about one-half normal.

"The train of increased employment reaching back through many communities and many industries that will be started by a public works program is bound to have a beneficial effect on business," Mr. Cutler concluded.

Employment Maintained Despite Decreased Road Expenditure

RECORDS covering road work are clear evidence that such work affords much employment, according to W. C. Markham, Executive Secretary of the American Association of State Highway Officials.

"I am basing this statement on a comparison of the contracts let and the actual enumeration of men employed by the States for the month of April," continued Mr. Markham. "There is no class of men in the country today making a greater effort to keep up employment than the State Highway Departments despite the fact that there has been a tremendous slump of contracts for the work in the first four months of 1932 compared to 1931. Shortening of hours and the employment of men, in many cases not more than three days a week, has permitted them to give some employment to even a larger number of persons, although it is not for a full week.

"Last year in the month of April in a report from 39 states, there were 2,378 miles of high-type road contract let, 2,836 low-type and 1,966 grading. This made a total in that month of 7,180 miles contracted for various stages of improvement. Comparing the same number of returns for this year in April, we find that the high-type contracts let has dropped to 1,262 miles, the low-type of 1,662 and grading to 900, making a total of 3,824 miles or a reduction of over 45 per cent. These mileages represented in money $95,828,518 for last year, while the contracts for this year only amount to $38,524,278.

"Despite the tremendous drop in contracts," declared Mr. Markham, "we find that during the month of April the State Highway Departments and the contractors working on state jobs gave employment to 205,221 over against last year's employment during the same month of 185,795. . . . During April of 1931 in Pennsylvania 10,102 people were given employment against 26,780 this year; Illinois, 8,866 last year against 14,155 this April; likewise in Michigan, 6,014 in 1931 compared to 11,124 in 1932; California, 7,857 against 11,071; Oregon, 3,537 compared to 11,821. . . .

"This statement of employment and contracts covering the month of April has nothing to do with the employment of men back of the job. It is conceded by all who keep account of these matters that there are two men behind the job furnishing materials for every man working directly on the job. I make this statement despite some publicity that is being made these days to the contrary. . . . It is very questionable if there is any other industry . . . that does or can afford more relief over a larger territory, among all classes of people, than what is being accomplished through the work of the State Highway Departments in developing our road systems during these trying times."

Public Survey Office in California Moves

IN THE INTEREST of retrenchment made necessary by a cut in the appropriations for surveys for the coming year the public survey office of the General Land Office for California has been transferred from San Francisco to Glendale, effective July 1st.

The office at Glendale, Commissioner C. C. Moore says, will become the record and operating office for this area and the extensive files in San Francisco will be transferred to that point.

Asphalt Paving Conference to New Orleans

NEW ORLEANS has been chosen by The Asphalt Institute for the Tenth Annual Asphalt Paving Conference to be held this year either in the week of November 28 or December 5th.

The program, in recognition of present economic conditions, will be devoted largely to phases of low-cost road construction, the major subjects for discussion including (1) The salvaging of all pavements which are in need of resurfacing or replacement, by utilizing inexpensive types, (2) The serious economic aspects of tax diversion and tax evasion of highway revenues, and (3) The urgent necessity of designing roads in proportion to their importance,—eliminating the "over-designing" evil.

Elected officers of The Asphalt Institute for the current year comprise: William H. Kershaw, of The Texas Company, President; C. W. Bayliss of the Barber Asphalt Company, B. L. Boye of the Standard Oil Company of New York and J. A. Blood of the Standard Oil Company of California, Vice-Presidents; J. S. Helm of the Standard Oil Company of New Jersey, Chairman of the Executive Committee; and A. M. Maxwell of the Standard Oil Company of Ohio, Secretary.

Asphalt Institute activities west of the Rocky Mountains are under the special jurisdiction of a managing committee composed of J. A. Blood of the Standard Oil Company of California, Chairman; W. G. Julier of the Gilmore Oil Company, Ltd., J. F. McSwain of the Shell Oil Company and Lawrence Wolff of the Union Oil Company of California.

The Imperial Oil, Ltd., which due to economic conditions withdrew last year, has been reelected to membership in the Institute.

To discover whether an ostrich is male or female—tell it a joke.

If he laughs, it's a male.

If she laughs, it's a female.

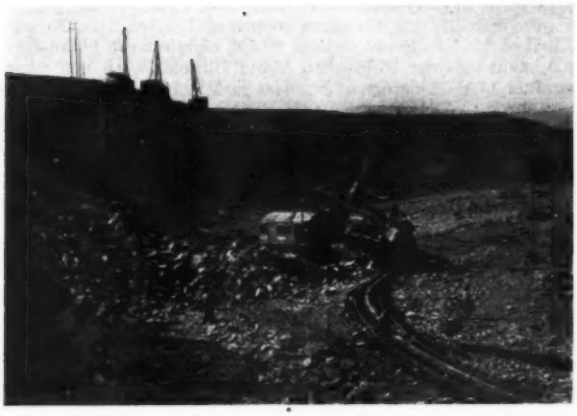
"There was a panic at the movies last night."

"What, a fire?"

"No, they switched the lights on."

Foreign

England



The above picture shows the operations of a well known English quarry in Derbyshire near the village of Hope. The owners are **Messrs. G. & T. Earle**, cement manufacturers. In the center is the latest addition to their shovel equipment, a Bucyrus-Erie 100-B 3-yard electric with Ward-Leonard control. Hauling equipment consists of 7-ton side dump steel cars drawn by electric locomotives.

The Hope Quarry is situated on the summit of a hill and the excavated rock is first conveyed to a primary crusher, which is situated at quarry level, that is to say the loaded cars can be dumped direct into the primary crusher. The rock is then conveyed by belt conveyors to secondary crushers until finally the powdered limestone rock arrives at the rotary kilns for final baking, the crushed rock receiving the other necessary ingredients en route.

The layout of the various crushers, grinders and mixing machinery makes the transport of the material easy, as it is constantly descending from the quarry level to the factory down below.

The quarry face is a difficult one to shoot due to the upward slope of the rock strata and careful blasting is necessary in order to break up the toe of the face.

Messrs. G. & T. Earle are to be congratulated on the excellent general layout of their factory which turns out the finished product sacked for export with a minimum amount of handling and no unnecessary manufacturing costs.

Canada

Montreal and Vicinity

By S. A. STEPHENS, Jr.

Work is continuing on the $3,500,000 **Wellington Street Tunnel** under the Lachine Canal. Considerable excitement and delay to grain shipping was caused when a weak spot in the canal bed near the tunnel excavation gave out shortly after the opening of navigation. The fault was not of the Dufresne Construction Co., Limited, who are doing the job, but of bad foundation conditions in the canal itself. The canal level dropped about 3 feet in a few minutes and as a result several ships were stranded. The completed part of the tunnel approach (north) and the present workings (south) were flooded. Canal traffic was tied up for two days—construction work for about one week.

Two Gas+Airs are on the job as cranes handling and driving piles with a McKiernan-Terry 9B-2 Pile Driver. A steamer with an extractor by the same maker is pulling piles on the completed part of the job.

Shipping in the Lachine Canal is very heavy and the Wellington Street Tunnel is being built to replace the present swing bridge—which is open most of the time.

Canadian Hoosier Engineering Co., Limited, Montreal, has been awarded contract for transmission line in connection with the $65,000,000 Beauharnois Power Development. Lines are to connect with those of the Ontario Hydro-Electric Power Commission and will consist of 126 spans of 1,050 feet on 60 foot towers. Amount of contract is about $600,000.

Another oil refinery scheduled for construction in the near future is that of the Shell Oil Company of Canada, Limited. The development will include erection of a refinery, oil storage tanks, pipe lines to the river front and a two-berth wharf for ocean tankers. Work is to start late in June and will amount to $2,000,000, adding one more large oil plant to Montreal East's total of four.

Collet Freres, Inc., have been awarded contract for erection of St. Paul Hospital at a figure of $1,200,000.

J. P. ANGLIN

We regret to report the sudden death of J. P. Anglin, well-known Montrealer and member of the firm of Anglin-Norcross, Limited, Contractors of Montreal and Toronto.

Foster-Wheeler, Ltd., St. Catharines, have the bulk contract for erection of a $1,000,000 storage plant and refinery at Montreal East for Joseph Elie, Limited.

Road construction in the Province of Quebec is the lowest in many years. Maintenance and repairs will be up to the usual standard and some contracts awarded last season have yet to be completed. Practically no new work is being undertaken.

British Columbia Notes

By A. W. WILLARD

The picture at the right shows **Dan McKenzie's** Bucyrus-Erie 1020 clearing up slides on the Trans-Provincial Highway near Hope, B. C. There was tough digging in some of these piles of debris of which this is a typical sample.

New England Notes

By J. C. ALEXANDER

C. J. Maney Company has practically completed the grading on the Center Street, Boston, widening project. Very severe digging was encountered on this work, as a section of the road passed through the quarry owned by the Rowe Contracting Co.; the excavation on this project being handled by 32-B and B-2 Bucyrus-Erie machines which are in the hands of very capable operators, John J. Scott and Guy Sheaff. The 32-B is shown above.

SURE-FOOTED

OVER loose, freshly dumped earth—on steep, slippery slopes—wherever the work calls, the "Caterpillar" goes. Sure-footed, it asks no favors of ground or grade or weather. Built of tough, wear-resistant, heat-treated steels—armored against dust and dirt—it willingly accepts severe conditions.

Power users have learned that in "Caterpillar" Tractors they get equipment that "steps-up" their entire operations—sets a high standard of capacity, dependability, endurance — puts the whole job on a basis that means fulfilled schedules, lessened costs.

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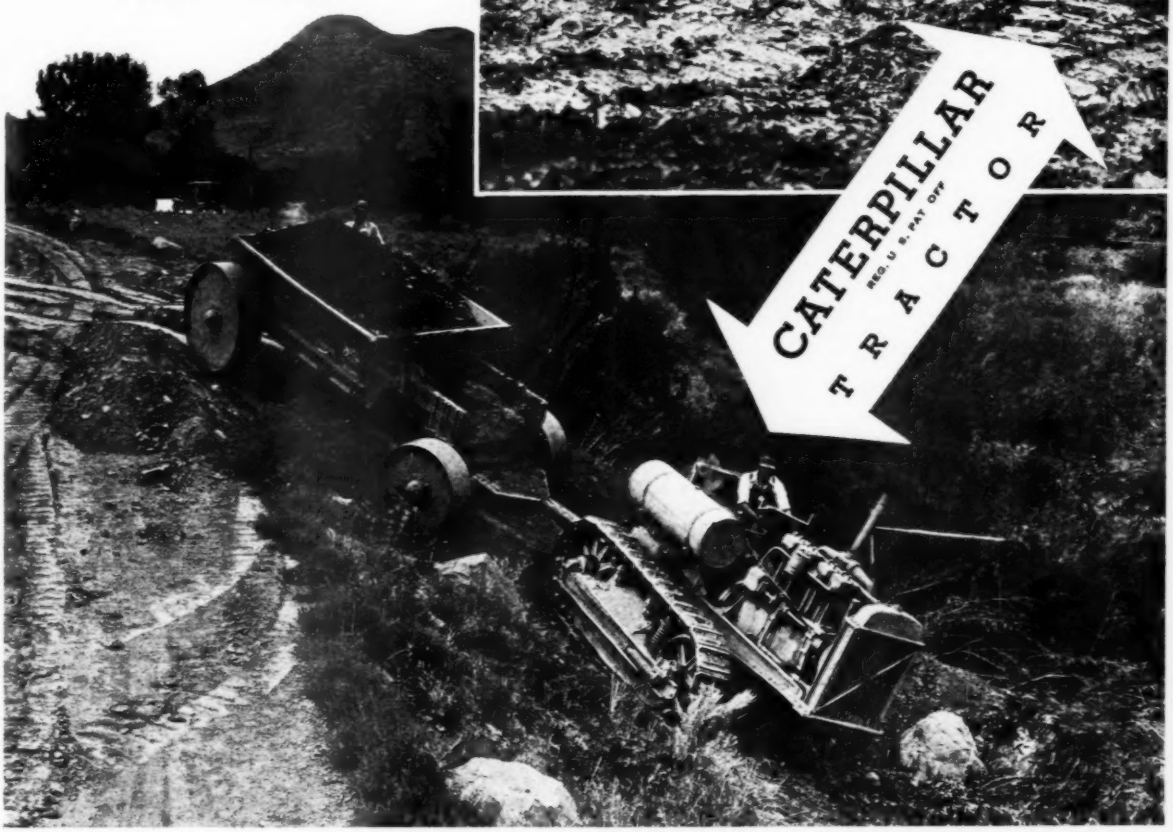

For your convenience in writing to Caterpillar Tractor Co., you will find a card bound in this issue.

Shots From the Firing Line— *Continued*

R. G. Watkins & Son have made very fast progress on their job at Porter, Maine. They have been using two Bucyrus-Erie 32-B shovels on this work which have given excellent output records.

New York Notes

Low bidders on June 8th bidding of New York State Department of Public Works were: **Peckham Corporation,** of White Plains, with bid of $139,567.90 on 4.80 miles from Cooksburg-Cairo in Greene County; **Joseph Kinzley Company,** of Hackensack, New Jersey, with bid of $22,334.15 on 0.46 mile, Montgomery-Goshen on Highway No. 65 in Orange County; **Davis and Stearns,** of Whitney Point, with bid of $199,637.20 on 6.44 miles from Angelica-Dalton in Allegheny County; **Kenneth J. Premo,** of Massena, with bid of $10,045.00 on 0.15 mile, Nicholville-Moirz, Highway 5284, in St. Lawrence County; **John De Michiel, Incorporated,** Torrington, Connecticut, with bid of $199,999.92 on 5.31 miles, Chatham-East Chatham in Columbia County; **John A. Hartwick,** of Clarence Center, with bid of $23,528.48 on 0.23 mile, Clarence-Hunts Corners, Highway 522, Tonawanda Creek-Hunts Corners, Highway 1064, Transit-Wolcottsburg, Highway 1493, in Erie County; **A. I. Savin,** of Hartford, Connecticut, with bid of $417,265.70 on 6.01 miles, Catskill to West Coxsackie, in Greene County.

At the June 14th letting of the New York State Highway Department, **Sanderspree & Bishop** of Fort Edward were low with $19,939 for the quarter-mile on the Elizabethtown-Keene Highway in Essex County; **Binghamton Construction Company** of Binghamton with $256,849 were low on the 2.95 miles on Southern State Parkway and approaches in Nassau and Suffolk Counties; **Dale Engineering Company** of Utica with bid of $119,447 on Port Leyden-Lowville 3.52 miles in Lewis County; **O'Grady & Quillinan** of Cohoes with $34,293 on a 0.61 mile, Richford to Center Isle in Broome County; **John Petrossi Company** of Rochester low with bid of $108,637 on 0.67 mile of the Auburn-Seneca Falls in Cayuga and Seneca Counties; **D. Lewis Construction Company, Incorporated,** low with bid of $183,810 on 5.78 miles in Fulton County, Gloversville to Broadalbin and Vail Mills to Mayfield; **Charles Shaffer & Son** of Buffalo were low with $113,221 on section 6A of the Grand Central Parkway including separation of grades at Commonwealth Boulevard in Queens County, a total of 0.39 mile.

New Jersey Notes

Bids were taken by the New Jersey State Highway Commission at Trenton on June 13th for construction of sections 8, 1A and 2A from Woods Corner to Williamstown on Route number 42, length 5.391 miles. The work includes 140,706 cubic yards of earth excavation; 4,533 cubic yards of wet excavation and 122,421 square yards of 9" reinforced concrete pavement.

On June 20th the Commission took bids on 3.787 miles in section 7, from Grenlock to Woods Corner. Also on route 42. This job includes 45,818 cubic yards of earth excavation; 33,566 cubic yards of borrow; 51,561 square yards of 9" reinforced concrete pavement and 10,25[illegible] square yards of 8" plain concrete foundation with 41,46[illegible] square yards of bituminous concrete surface, also one 20[illegible] span bridge over Timber Creek.

Another job bid June 13th was a 1300 foot viaduct to carry route 29 across the Waverly Yards of the Pennsylvania Railroad in the city of Newark. Among other items in this job is 99,500 lineal feet of untreated wooden foundation piles.

The New Jersey State Highway Commission received bids June 27th for construction of Route No. 29, Section 1-B, Hilldale Place to the Elizabeth River, Union County. Length 1.314 miles, including 6,415 cubic yards unclassified excavation; 7,733 cubic yards borrow; 25,496 square yards 9" reinforced concrete pavement and 1,712 square yards bituminous pavement. Also construction of Route S-28, Section 1-A, from Route No. 25 to Westons Mill and paving at Raritan River Railroad Bridge, Middlesex County. Length 0.719 miles. Estimated, 27,248 cubic yards unclassified excavation; 22,530 square yards 9" reinforced concrete pavement; 2,062 square yards 7" plain concrete pavement and 3,122 square yards penetration macadam pavement.

Pennsylvania Notes

The accompanying illustration shows the 43-B gasoline dragline, owned by **R. M. Griffiths,** stripping hard earth and rock on the Old Road between Nesquehoning and Summit Hill.

Buffalo and Vicinity

By G. E. PETERSON

The Port of Albany, at Albany, was officially opened and dedicated on June 6th and 7th. The celebration and dedication lasted over both days and were marked by speeches by Governor Roosevelt and several other distinguished men. There were several parades with the best bands of the state playing and also fireworks to commemorate the opening of the Port. One very interesting ceremony was the "Wedding of the Waters." This was a mixing of waters from every principal body of water on the earth, which indicated that

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Bulldog Closed Wedge Rope Socket

Bulldog Wedge Rope Sockets never fail. Unskilled labor, in practically no time at all, can apply one of these sockets. They are the safest, quickest and most convenient way of attaching wire rope.

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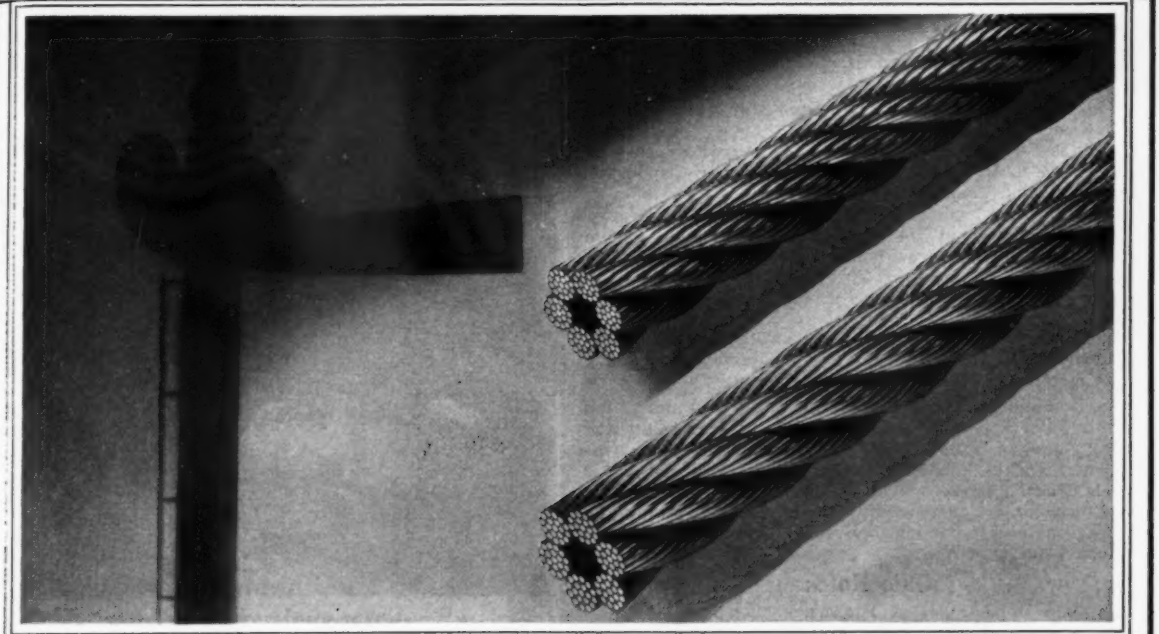

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that assures maximum rope economy

In buying wire rope it is your aim to secure the rope which will give you safe service at lowest cost. It is Roebling's aim to aid you... and it is in an enviable position to do so.

In making recommendations our sole interest is to see that you get the rope that will best meet your needs. And we are fully free to give you absolutely unbiased advice... first, because of the completeness of the Roebling Line; secondly, because we are not prejudiced in favor of any one kind of rope.

Made in a great variety of types and designs, Roebling Ropes span *every* wire rope need. They include Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of flexibility in both rope and strand constructions. In fact, there is no wire rope requirement that cannot be met by Roebling Rope with utmost service safety and at lowest operating cost.

These features of Roebling Advisory Service safeguard the rope buyer. They are his assurance of maximum rope economy with maximum rope safety.

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A plain statement about Wire Rope Economy

Roebling does not indulge in nor encourage sweeping claims of superior wire rope economy. Such claims, if generally made, would merely confuse the rope user. ¶ For the guidance of rope buyers, however, Roebling does assert that when gauged by the work performed, NO wire rope, regardless of make or construction, will show lower general average operating costs than Roebling.

Wire Rope for all purposes

The importance of selecting the right rope for each use cannot be too strongly emphasized. For no one rope will meet all requirements. ¶ Roebling makes wire rope of a great variety of types and designs, including Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of rope and strand flexibility. ¶ The great stamina of all Roebling Ropes is primarily due to the quality of Roebling Wire. This Acid Steel Wire is renowned for its fatique resisting and wearing qualities. No better rope wire is produced. ¶ "BLUE CENTER" STEEL is the highest grade and is generally recommended for severe duty.

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Shots From the Firing Line — *Continued*

vessels would come to Albany from every country in the world. Already several boats have docked at the Port of Albany, bringing in lumber, canned goods, molasses and bulk cargoes of every description. These vessels have then been loaded with products of the United States and departed for the various ports of the world.

Peter Ten Eyck, chairman of the Albany Port District Commission, is, in a very large way, personally responsible for the splendid project becoming a reality.

At the present time, a 13,000,000-bushel grain elevator is being completed at the Port, which will handle grain from barges coming through the Barge Canal and load it into ocean vessels for export. This elevator is being built by the James Stewart Company of Chicago and is the largest of its kind in the world.

The Port of Albany will, without doubt, be a distinct benefit to the City of Albany and will undoubtedly become one of the most active ports of the United States.

The Binghamton Construction Company of Binghamton are low bidders on 2.95 miles of concrete in Nassau and Suffolk Counties. This job also has 57,000 yards of excavation which will be handled by their Bucyrus-Erie Gas + Air shovels. Charlie Carris will be in direct charge of this job. The Binghamton Construction Company is also laying the Amesite on the Ursitti job in Broome County and this job is in charge of Tom Wright.

Ohio Notes

The Ohio Department of Highways opened bids at Columbus June 10th for more than $2,500,000 worth of highway and bridge construction.

Indiana Notes

Myers & Hoke of Campbellsburg with a bid of $54,393.33 were awarded the contract for grading 5.892 miles on Road 35 in Brown County.

Bonds in sum of $409,000 were offered for sale June 15th to provide funds for construction of the Broad Ripple, Irvington and Pogue's run sewer projects in Indianapolis.

The Sanitary Board has authorized the **Columbia Construction Company** to take over the contracts held by the Swords-McDougal-Lancaster Company and Willadsen-Thompson Company both of Peoria, Illinois. Other contracts for these sewers are held by **Krenn & Dato Construction Company** of Chicago and Indianapolis and **John Dehner, Inc.** of Fort Wayne.

The above illustration shows Caterpillar Fiftys and Euclid 8-yard wagons hauling from the 1¼-yard Northwest shovel owned by the **Calumet Paving Company** of Lafayette, Indiana. This contract consists of 500,000 yards of sand to be excavated from the Wabash river bottom near Lafayette for the construction of the new U. S. Highway 25 along Wabash to Delphi, Indiana. Four wagons from this shovel average 1200 yards per day on a half mile haul. T. W. Kreager is foreman on the job.

Illinois Notes

Harry Riley of Shelbyville was awarded 13 miles of grading in Shelby County on State Aid Routes No. 16 and 11.

F. C. Raemisch of Waunakee, Wisconsin was awarded Section 2-1 (MFT), 7,316 miles of grading, culverts and crushed rock resurfacing, for $28,393.40 in Jo Daviess County.

A settlement has been arranged between Marseilles city officers and La Salle County officials and the State Department of Purchases and Construction for the **erection of new Marseilles bridge.** The city will pay $10,000 and the county $40,000 toward construction of this bridge which is estimated to cost $190,000. Bids may be taken by July 15th.

Peter Simons of Quincy, on a bid of $19,686.85, was awarded the contract for grading 5.417 miles in Section 5A of Adams County.

A. J. Bohlken of Arlington Heights, with a bid of $6,932.23, was awarded the contract for grading section 128A in Henry County.

H. H. Enbody & Sons of Aurora were awarded the contract for grading section 106A in Stark County with a bid of $50,708.54

Martin Wunderlich of Jefferson City, Missouri was awarded the contract for grading section 110A in Macoupin County with a bid of $56,629.62. He was also awarded contract for grading section 129A in St. Clair County with a bid of $113,268.49.

L. Gray of St. Louis with a bid of $8,075.72 was awarded the contract for grading section 105VA in Montgomery County.

S. J. Groves & Sons Company of Libertyville with a bid of $126,650.19 was awarded the contract for grading section 116A in McHenry and Lake Counties.

Jansen & Schaefer of Pekin were awarded the contract for grading section 108A in Tazewell County with a bid of $21,898.73

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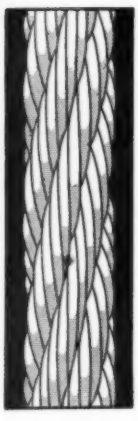

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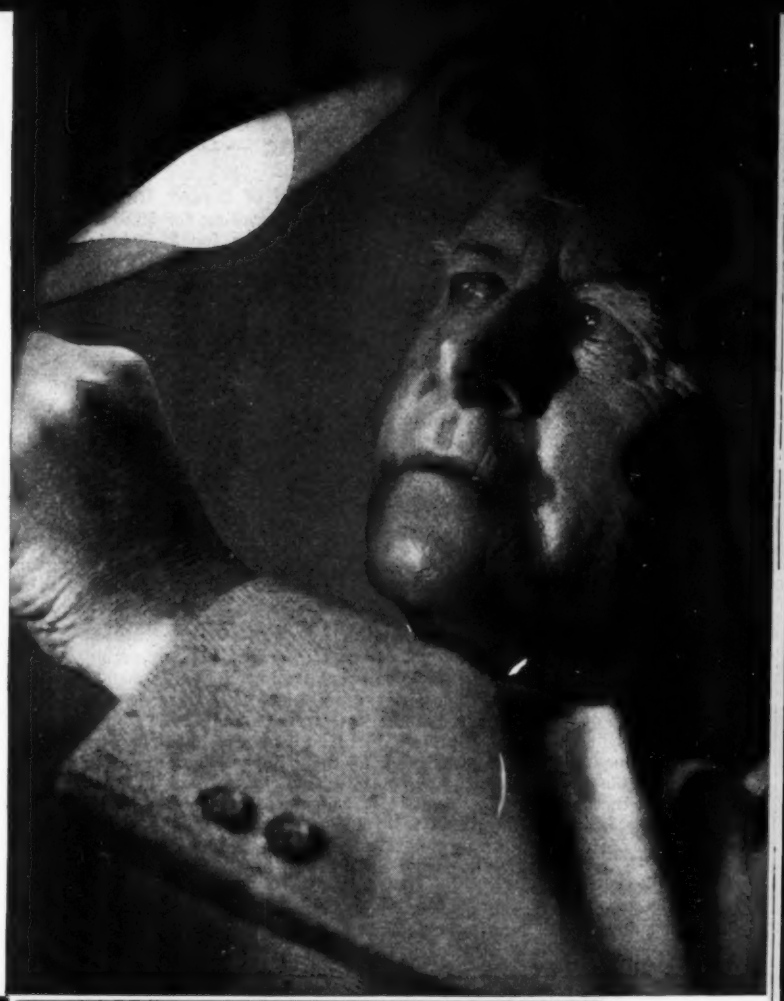

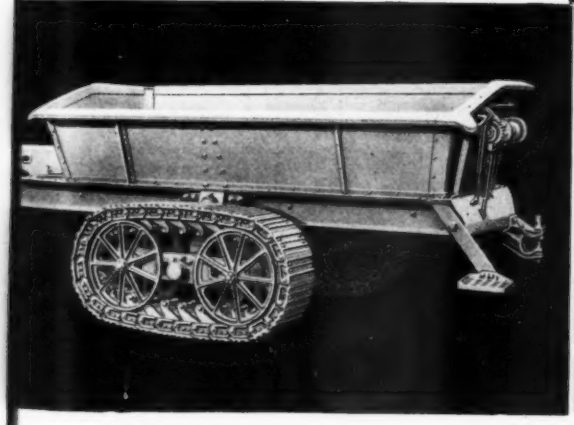

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Shots From the Firing Line — *Continued*

In Macoupin County **M. C. Robinson** of Girard, Illinois was awarded section 5A(MFT), 4 miles grading for $9,871.-85 and section 7A(MFT) 4 miles grading for $8,594.81; **H. M. Johnson Construction Company** of Mt. Olive, Illinois was awarded section 8A(MFT), 3.88 miles grading and culverts for $11,601.85.

In Stephenson County **E. F. Gallagher** of Oregon, Wisconsin was awarded section 12(MFT), 6.857 miles graveling for $36,307.54.

Chief Highway Engineer Frank T. Sheets of State Highway Department has outlined the $2,000,000 program of the state for improvement of Chicago streets used as state highways. Chicago will cooperate on 16.64 miles of the program and the state will undertake 15.13 miles of resurfacing and widening alone.

M. Hayes & Sons of Chicago were awarded Section 1 (MFT), in Fulton County, 5.77 miles grading and culverts for $20,949.

Sealed bids, in duplicate, will be received at United States Engineer office, St. Louis, Missouri, until 11 a. m., June 30th, 1932, and then opened, for placing about 1,150,000 cubic yards of earthworth in rebuilding and enlarging the levee of Valley City Drainage & Levee District, Pike County, Illinois, on the Illinois River. The proposed improvement is located on the right bank of the Illinois River opposite Naples City, Illinois. The work begins about 3½ miles west of the upper end of the district, continues downstream along the Illinois River from mile 62.6 to 66.4 above the mouth to high ground approximately 1 mile north of Valley City.

There are three sections: Section No. 1, with 444,000 estimated cubic yards, length in feet of 21,500 and average height of levee 14.5; Section No. 2, with 372,000 estimated cubic yards, length in feet 12,582 and average height of levee 17.5; and Section No. 3, with 334,000 estimated cubic yards, length in feet 5,882 and average height of levee 18.0.

Kentucky Notes

By W. E. CHAMBERS

The State Highway Commission on June 15th approved contracts for 62½ miles of highway to cost $500,000. It also rejected bids on a Pulaski County project and deferred action on bids received for projects in Bath, Carroll, Christian, Fleming, Oldham and Rowan Counties.

Successful bidders were: **Cumberland Construction Company**, Burkesville, 2.926 miles grade and drain on Albany-Jamestown Road in Clinton County, $12,238; **E. A. Wood & Company, Nashville,** 12 miles grade and drain on Dry-Ridge-Owenton Road in Grant County, $113,624; **K. V. Johnson,** Iuka, grade and drain on Smithland-Birdsville-Bayou Road in Livingston County, $30,918; **Corum Brothers,** Madisonville, 2.93 miles grade and drain on Beech Grove-Rangers Landing Road in McLean County, $14,972; **Cumberland Construction Company** of Burkesville, 7.6 miles grade and drain on Edmonton-Tompkinsville Road in Metcalfe County, $44,317; **Cumberland Construction Company,** Burkesville, 8.68 miles grade and drain Tompkinsville to Tennessee State Line in Monroe County, $28,081; **Cundiff & McDowell,** Somerset, 2.82 miles grade and drain on Russell Springs to Fairview in Russell County, $8,236; **N. E. Stone & Company,** Madisonville, 12.5 miles surfacing on Hopkinsville-Cadiz-Paducah Road in Trigg County, $169,-910; **Lewis & Kelly,** Harlan, 6.7 miles grade and drain and surfacing on Williamsburg-Pineville Road in Whitley County, $81,972.

Sweet (disgusted): "My boy friend has cold feet."

Fond Auntie: "Shame on you, young lady. In my days we didn't find out those things until we were married."

Runner: What makes you think you are qualified for a post in the diplomatic corps?

Super: Well, I've been married for 20 years and my wife still thinks I have a sick friend I sit up with.

Old Man: "Don't think for a minute you're going to marry my daughter."

Young Man: "Fine—you get me out gracefully and I'm your friend for life."

Kit: "Gee, but that date last night was fresh."

Kat: "Why didn't you slap his face?"

Kit: "I did; and take my advice, never slap a guy when he's chewing tobacco."

Mother's in the kitchen, washing up the jugs;
Father's in the cellar, bottling up the suds;
Sister's in the pantry, mixing up the hops—
While Johnny's on the front porch, watching for the cops.

A Wire Rope *Fundamental*

Every wire rope sold by Bucyrus-Erie Company is of *uniform high quality* throughout . . . constructed with greatest care by precision machinery and skilled workmen. But this is not the only safeguard you get when you buy rope from us.

Selection of the *proper* wire rope for the operating conditions to be encountered is *fundamental.*

In over 50 years' experience in building all types of excavating machinery, Bucyrus-Erie Company has gathered much valuable operating data on wire ropes. The advantage of this experience will be passed on to you when you send us your next wire rope order.

Always have an extra rope on hand . . . it may prevent a needless shutdown when continuous output is sorely needed.

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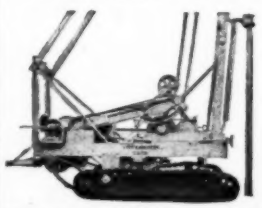
Practically every new development in churn or well drilling equipment has been a Loomis achievement.



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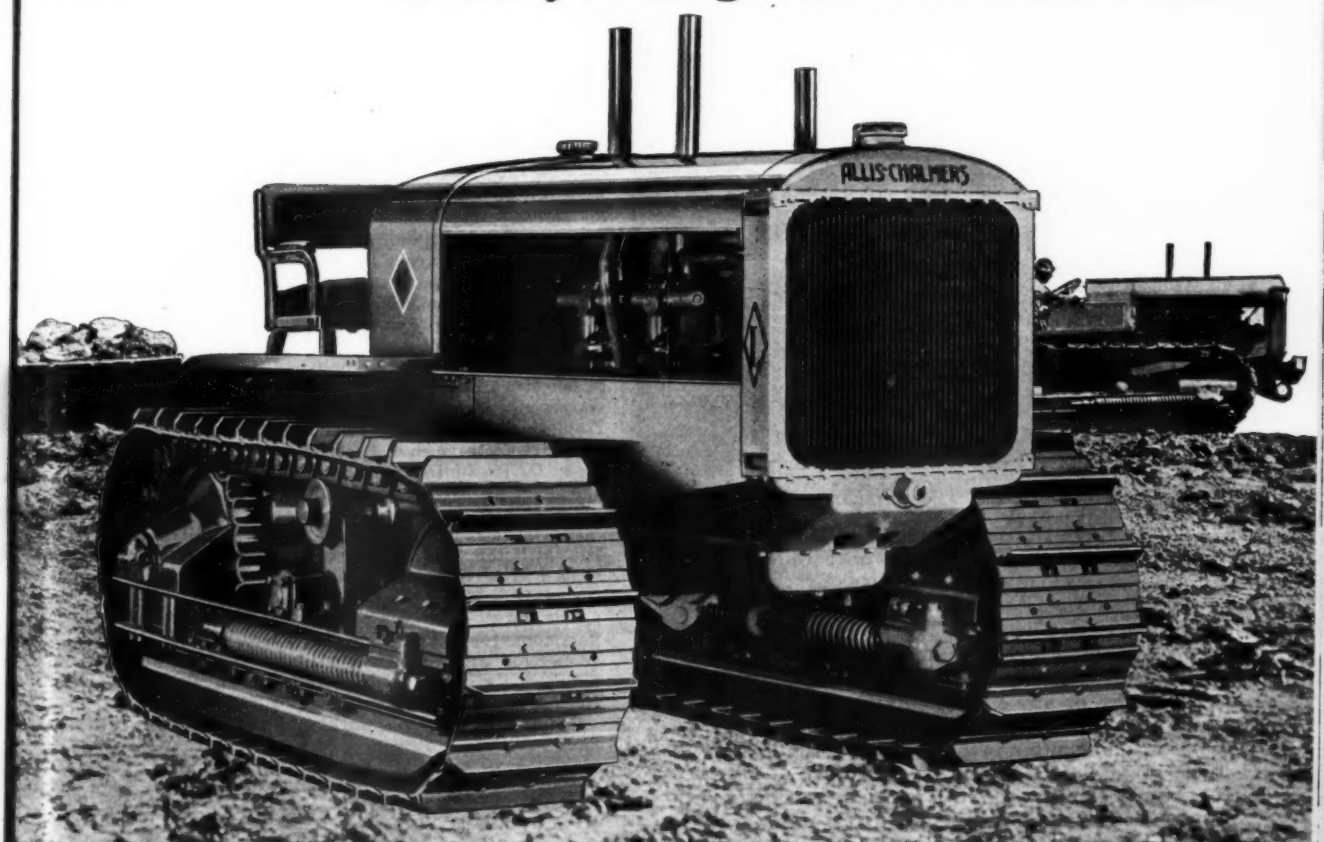

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TRACTOR CRANES • HAND CONTROLLED GRADERS • WHEEL TYPE TRACTORS

Shots From the Firing Line — *Continued*

St. Louis and Vicinity

By A. J. KOENIG

Construction of four viaducts and underpasses on the lines of the Chicago & Alton Railroad in Jackson county was ordered by the Missouri Public Service Commission paving the way for important highway projects in Jackson county. The projects ordered are a viaduct at Noland street south of Independence, a viaduct over Blue Springs road in Blue Springs, a viaduct at Van Horn Road and an underpass at Sterling avenue.

Allotments of $376,600 for **improvements on the Missouri River** from Kansas City to its mouth were approved by the War Department. Of this amount $26,600 was for emergency repairs and $350,000 to meet payments under existing contracts.

The Department also alloted $830,000 for various improvements in the Mississippi Valley. This includes $410,000 for improvement on the Mississippi River between the Wisconsin River and the Illinois River.

M. C. Robinson, Girard, Ill., was awarded contracts for two bridges and some grading work in Macoupin county, Illinois.

The Madison Construction Company was awarded a bridge section in Macoupin county at their bid of $13,660.

Cameron-Joyce & Company, Keokuk, was low with a bid of $43,485 for brick resurfacing 1.53 miles on route 78 in Fulton county, Illinois. This company was awarded contract for paving 5.07 miles of road in Sangamon county, Illinois.

The Illinois State Highway Department received bids on June 6th for highway work totaling $1,205,307. The projects include jobs of widening and salvaging 35 miles of narrow worn out pavements by resurfacing with brick and widening to twenty feet by the addition of concrete shoulders.

Building a 40 Foot Fill

Raising this 40 foot fill on a railroad construction job, without the use of jacks—or the building of a trestle, is just one of the many instances where the Track Machine has been used at a great saving in time and labor. Disposing of overburden at quarries and mines, or any similar job where a track gang is maintained for shifting and raising, this machine and a few men will do the job quickly and soon pay for itself out of expense ordinarily required for men working with bars and jacks.

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Bids were received June 13th by the city council of Springfield, Illinois, for two earth road improvement projects in connection with the Springfield Lake project. Excavation of approximately 70,000 cubic yards of earth is involved.

Peter Simmons, Quincy, Illinois, was awarded contract for grading 4.6 miles of earth road in Cass county, Illinois.

The Harrison Construction Company of Kansas City was awarded 13.39 miles of paving in McHenry county.

The Powers-Thompson Construction Company, Joliet, have contract for building a retaining wall and widening an arch bridge in Wills county, Illinois, at a cost of $15,033.

Bids were received on June 7th by the Missouri State Highway Commission on 81 road projects totaling approximately $1,276,000.

On their bid of $41,142 the **McCarthy Improvement Company** of Davenport, was awarded contract for grading on route 148 Illinois, in Franklin and Jefferson counties.

Southern Notes

The contract for the construction of the substructure for a double-track bascule bridge of the Texas Pacific-Missouri Terminal Railroad of New Orleans across the Intracoastal canal at Harvey, Louisiana has been awarded to **Thomas H. Brockman,** New Orleans, at a cost of $71,290.00.

Victor L. Phillips Company have temporarily combined their Tulsa office with their Oklahoma City office. J. C. Schwenk, who was in charge of the Tulsa office, is now making his headquarters in Oklahoma City and will cover his Tulsa office territory as in the past from that point.

Colorado Notes

By H. M. BIBAUD

The Pueblo Bridge and Construction Company was awarded contract by the State Highway Department for building a 195-foot bridge over the Fountain River on the Ute Pass road on bid of $30,959.

J. H. Miller and Company, highway construction contractors, who have just completed building a stretch of highway in the Bayfield section, were awarded the contract on bidding May 25th for construction of a new highway between Cedar Hill and Aztec, New Mexico. This job will be one of the biggest road projects in the Southwest this year. It will include the construction of at least one big bridge and two medium size bridges. The J. H. Miller and Company bid was approximately $226,000.

Federal Aid funds will be requested by the **Twin Lakes Reservoir and Canal Company;** of Ordway, to construct a $2,000,000 trans-mountain diversion project on the headwaters of the Arkansas River. 20,000 acre feet of water from the headwaters of Roaring Fork would be diverted and carried through a diversion tunnel under Independence Pass. O. R. Smith is manager of the Company.

The State Highway Department was authorized, May 25th, to spend $198,000 for highway maintenance equipment. Governor Adams announced that an agreement exists with the State Engineer that equipment will be purchased after competitive bids are offered by the manufacturers.

The lowest bids ever received by the State Highway Department for concrete paving were opened June 7th in connection with the construction of 11 miles of paved road between La Junta and Hadley. **J. B. Bertrand,** Denver contractor, made the low offer of $160,323.

Maintenance crews, working since the first of March, have succeeded in opening the main entrance road to the **Mesa Verde National Park.** Slides have been cleared, settled places have been filled and the road has been made perfectly smooth.

Nevada Notes

Jones and King of Hayward, California were awarded contract at the May 12th letting for reconstructing the State Highway between Washoe Summit and Carson City in Washoe and Ormsby Counties. Their bid was $332,751.69.

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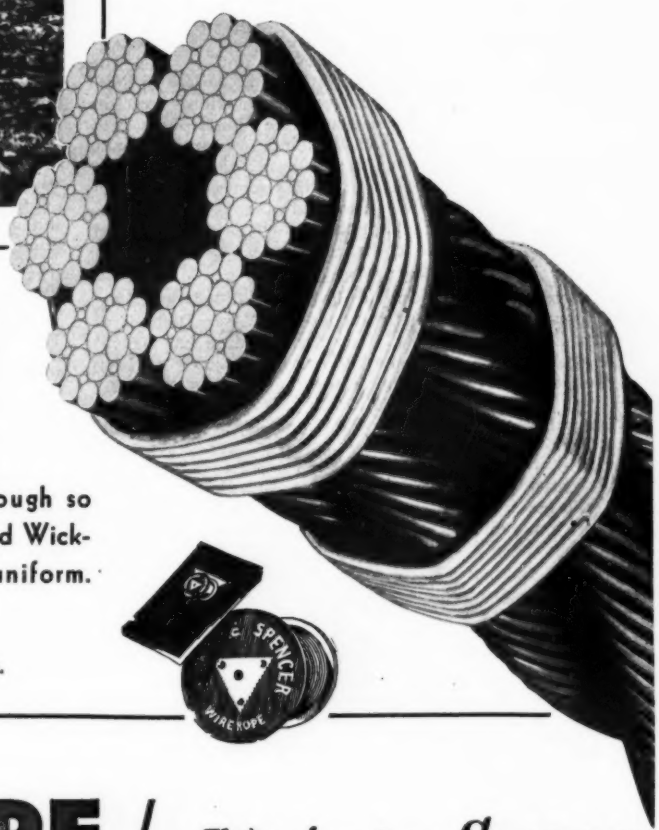
Here's rope abuse



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Shots From the Firing Line — *Continued*

Arizona Notes

Orr and Rawls of El Paso, with a bid of $118,400.75, were low on the contract for grading, draining and placing of subgrade stabilizer on the Benson-Douglas Highway beginning at Tombstone and extending 8.9 miles northwest.

At the bidding of June 10th, **H. L. Royden** of Phoenix was low on the reopening of Federal Aid Product No. 24 covering the Flagstaff-Williams Highway, consisting of grading, draining and subgrade stabilizer on 8.2 miles. Contractor Royden's bid was $53,389.30.

San Francisco and Vicinity

By GEO. C. McNUTT

J. Catucci, Oakland, recently had two Bucyrus-Erie Gas÷Airs busy on the excavation for the new University of California men's gymnasium. This new $1,000,000 structure, replacing the historic Harmon-Gymnasium built in the 70's, is to be one of the most complete plants of its kind in the country. Facilities proposed include swimming pools, large basketball auditorium, handball and squash courts, boxing and wrestling rooms, etc. It is planned for completion in January, 1933. The above view shows one of the Gas÷Airs loading to GMC truck. Dinwiddie Construction Company has the general contract.

By H. L. LIVINGSTON

The Supreme Court of California has validated the $220,000,000 bond issue for the Metropolitan Water District of Southern California and while no definite date has as yet been set for the commencement of work, the court decision will unquestionably start the largest project in the west under way in the very near future. This undertaking will result in bringing water from the Colorado River near the Hoover Dam site to the Metropolitan area of Los Angeles.

Granfield, Farrar & Carlin of San Francisco are moving two 1¼ yard Bucyrus-Erie Gas÷Air shovels out to the Glacier Point Highway in the Yosemite National Park to start work on their 333,000 cubic yard excavating job. This contract has been held up due to unusually heavy snowfall in the valley but will be double shifted and put through in fast time.

Basich Brothers of Torrance, submitted low bid to the California Division of Highways for 10.1 miles of grading, and asphalt and concrete paving from San Pablo to the Carquinez Bridge. This job involves 291,000 yards of highway excavation. The amount of the bid was $322,793.00.

The City and County of San Francisco bidding against contractors were the low bidder on all propositions to the Department of Public Utilities of San Francisco for completing the coast range tunnels on the Hetch Hetchy project for bringing water into San Francisco. This is the last unit of the Hetch Hetchy project and will complete the entire undertaking. The amount of this bid was $5,257,665.00. Contractors have protested against the city doing its own work and the matter has been taken under advisement.

Construction work, in general, is rather quiet in Northern California but with several dams under construction, another one to be started and with the work on the Metropolitan Water District to open up in the near future, together with an extensive highway program, Southern California apparently will be the center of contracting activities for the remainder of 1932.

By J. H. SACKETT

Bids for work estimated to total $6,058,900 **will be called** by the California Division of Highway during June and July. The principal projects as reported by Western Construction News include: 2.4 miles concrete paving from Dublin to Hayward in Alameda County, $160,000; 4.8 miles bituminous surfacing from Drytown to Martell in Amador County, $21,700; 0.8 mile paving in Placerville in El Dorado County, $40,000; 3.1 miles concrete paving and construction of bridge from Fresno to Fancher Creek in Fresno County, $216,200; 9 miles of grading and asphalt concrete paving from Sand Hills to 5 miles west of Yuma in Imperial County, $441,000; 6 miles grading and concrete paving from Pomona to Brea Canyon in Los Angeles County, $350,000; 6 miles grading and paving from Barranca St. to Pomona in Los Angeles County, $420,000; 1.25 miles grading and surfacing from Little Dann Creek to Leggett in Mendocino County, $85,000; 3.4 miles grading and surfacing from San Remo Divide to south of Carmel River in Monterey County, $176,000; 11.8 miles bituminous surfacing from Nevada City to Washington Road in Nevada County, $41,000; 5.7 miles of paving from Irvine to Tustin in Grange County, $177,000; 16.5 miles grading and surfacing from Halloran Summit to Mountain Pass in San Bernardino County, $334,000; 5 miles grading from near Camp Waterman to end of County paving in San Bernardino County, $625,000; 4 miles grading and bituminous macadam surfacing from Saratoga Gap to Block Road in Santa Clara-Santa Cruz County, $300,000; 7.2 miles grading and paving from Oregon Avenue to Alviso Road in Santa Clara County, $413,000; 6.5 miles grading and bituminous macadam surfacing Inspiration Point to Vine Hill Road in Santa Cruz County, $343,000; 4.4 miles asphalt and concrete paving Rose Canyon to Sorrento Creek in San Diego County, $253,500; 0.6 mile paving San Francisco to South San Francisco in San Mateo County, $42,000; 9.5 miles grading and surfacing from Canyon Creek to Hat Creek in Shasta County, $293,000; 8.5 miles grading and oiled surface from Lemon Cove to Three Rivers in Tulare County, $350,000; bridge at Squaw Rock Slide in Mendocino County, $35,000; bridge over the Merced River in Merced County, $215,000; bridge over Wildcat Creek in Monterey County, $70,000; bridge over Mojave River at Barstow in San Bernardino County, $101,000; grade separation at north city limits of San Diego in San Diego County; bridge over Paradise cut in San Joaquin County, $77,500; bridge over Stanislaus River in San Joaquin-Stanislaus County, $94,000; bridges over Pit River, Hat Creek and Fall River in Shasta County, $95,000; bridge over the Ventura River in Ventura County, $290,000.

Young Artist: "You are the first of my many models I have ever kissed."

Model: "How many have you had?"

Y. A.: "Four. An apple, a banana, a bouquet, and you."

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P-48

Oregon Notes

By MARC D. TROYER

Silver Falls Timber Company of Silverton is using the above Bucyrus-Erie 1¼ yard Diesel+Air shovel for building railroad grade out of Silverton. The owners are very well pleased with the machine which is replacing two ¾-yard steamers. Particularly appreciated is the economy of the Diesel+Air compared with the old steam equipment. At the time the picture was taken the shovel had just completed a particularly wide cut where a spur track is to be accommodated. Considerable of the material was hauled to a long fill nearby. In the foreground is Superintendent H. R. Irish and coming toward him, we meet Gene Daily, Portland representative, Sullivan Machinery Company. Fred Enger has been operating the shovel.

Odom & DuRette of Salem on their bid of $6,924.50 was awarded construction of 1,200 lineal feet of concrete pavement in the Elk Creek Tunnel on the Umpqua Highway west of Drain in Douglas County.

The Brooks-Salem section of the Pacific Highway 7.01 miles of grade widening and paving in Marion County went to **West Contract Company** of Portland for $127,455.00 on Alternate "A".

In Umatilla County the Sand Station-Washington State Line section of the Columbia River Highway, 8.02 miles of grading, went to **S. H. Newell & Company** of Portland on bid of $202,973.00, covering project A and B using corrugated iron pipe. S. H. Newell & Company also received the Deschutes River Tunnel section of the Columbia River Highway, widening for $5,760.00.

The Dillon Section of the Columbia River Higway in Wasco County consisting of 1.1 miles of grading, went to **Clifton & Applegate**, of Spokane, on bid of $19,832.00.

Washington Notes

J. A. Terteling & Sons of Spokane with a bid of $25,288 was awarded the contract for grading and surfacing about 1.6 miles of State Road No. 15, Summit East in Chelan County involving about 9 acres of clearing, 45,850 cubic yards of excavation, 5,150 cubic yards of crushed stone, 1,098 lineal feet of pipe culverts and other items.

Strong & Macdonald, Incorporated, of Tacoma, with a bid of $52,560 was awarded the contract for the construction of two concrete girder bridges across the Methow River on the Methow Valley Highway between Pateros and Carlton in Okanogan County, consisting of one bridge 408 feet long and one bridge 290 feet long, both with 24-foot roadway.

"If you wear that costume to the ball you'll get pinched."
"I don't care as long as they don't go any further!"

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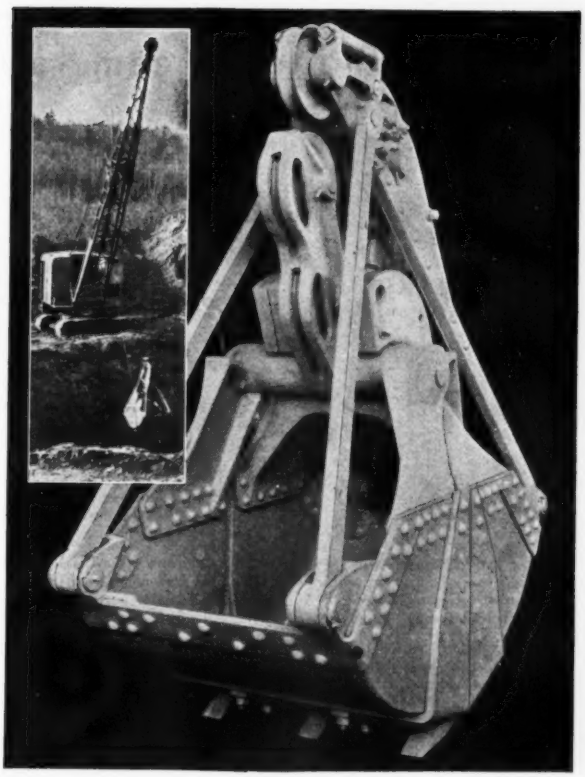

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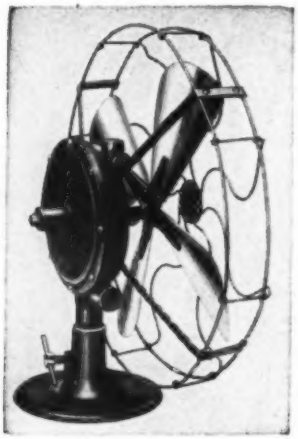

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This fan is self-oiling, requires little or no attention while in service. A ¼-inch pipe will supply all the steam it needs.

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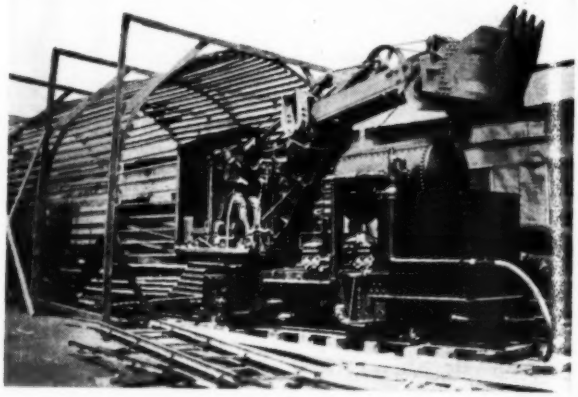
Hayward Buckets

Digging the World's Longest Tunnel

(Continued from page 332)



This picture, taken in the manufacturer's test yard, shows how the Bucyrus-Erie special tunnel shovels are able to reach back and load cars well to the rear. Note that the digging unit is full revolving. The dipper carries 1¼ yards struck measure.

500 pounds per square inch was used successfully to shut off most of the inflow of water. Eight or more successive groutings were sometimes required to control some of the inward leakage which amounted at one time to over 2,000 gallons per minute.

Under the valley of the Bronx River a zone of badly broken, water-bearing rock was encountered in which conditions were so difficult that it took seven months to advance the tunnel 100 feet through the bad area.

Muck was removed from the tunnel in side-dump steel cars of about 4 cubic yards capacity. Trains of three to six cars were hauled through the tunnel by storage battery locomotives to the cage hoists at the bottoms of the shafts.

Automatic elevators hoist muck

A 350-horsepower Nordberg mine hoist was used with Ward-Leonard G. E. controls. The "two stories" of the head-frames were the street level, used for loading drill-steel and other materials, and the dumping platform where the muck was emptied from the muck cars into chutes and thence to trucks.

Seven-ton Mack trucks with steel self-dumping bodies, holding seven cubic yards of broken stone were universally used. Final disposal of excavated material was chiefly in fill on vacant lands, except in Brooklyn were it was loaded on barges and towed out to sea and dumped.

A novel dragline mucker

Following the meeting of headings, the muck was excavated from the invert and the tunnel trimmed and cleaned preparatory to placing the tunnel lining.

For this trimming and cleaning very satisfactory use was made of a dragline mucking machine in several sections. The machine consisted, briefly, of a long traveler built of structural steel, supporting

in its central portion an elevated platform. From the rear of this elevated platform dragline mechanism hauled a dragline bucket up along a wide sloping platform or ramp which ran from the bottom of the invert excavation up to the elevated platform. The cable operating the drag bucket was run to a snatch block in the heading. This snatch block was hung on a steel pin driven into a drill hole in the rock. The position of the steel pin and snatch block were changed from time to time to permit the bucket to reach all parts of the heading. The muck hauled up this ramp was deposited by the dragline bucket over dumping gates in the floor of the elevated platform. When sufficient muck accumulated on this platform the gates were opened and the muck fell into cars that were waiting on a track beneath. The whole machine, including the platform and ramp, was mounted on wheels that rolled on tracks laid on the invert.

Lining the tunnel with concrete

Pneumatic concrete placing machines were used in lining the upper half of the 17-foot bore. The invert was poured by gravity methods. Concrete for lining was mixed at the top of the shafts and dropped down through chutes into side-dumping, tilting-body cars which, in turn, carried the concrete through the tunnel to the invert forms and the pneumatic placing machines.

Sectional steel tunnel forms were used. These were mounted, for the headings, on steel carriages running on tracks on the concrete lined invert. Moved into place they were raised to position by jacks and, after the concrete was blown, dropped down again to be moved. They were found to be comparatively easy to set, strip, move and reset.

Concrete was blown by air pressure between the faces of these collapsible forms and the rock walls of the tunnel. The quality of the concrete as placed by this method was exceptionally good, being denser, smoother and stronger than hand-placed concrete.

Co-ordination speeds construction

It is probable that no other work of similar kind has ever been carried on with greater expedition or greater efficiency than Tunnel No. 2 for the Board of Water Supply of the City of New York. At the present rate of progress the entire tunnel will be completed more than a year in advance of the requirements.

Working simultaneously at 17 widely separated shafts, the great problem was co-ordination of effort—the maintenance of uniform progress at all points. The recent holing through of the final two headings more than 12 months ahead of schedule is therefore a triumph of co-ordination between the commissioners and engineers of the Board of Water Supply, the contractor and his staff and the thousands of men who toiled far underground to provide New York with one of life's most important necessities—water.

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Monitor Silver Strand Wire Rope is an outstanding achievement of the American Steel & Wire Company. Into its manufacture go not only the highest quality materials—but the rich experience gained through 100 years of wire development. A standard for gruelling service—the strongest grade of steel used in wire rope construction assures strength to spare.

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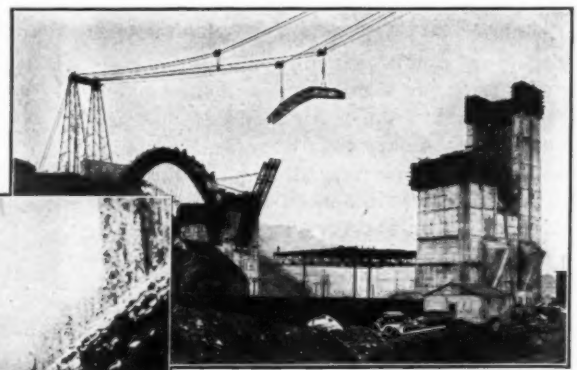
"HERCULES" RED-STRAND WIRE ROPE

REG. U. S. PAT. OFF.

AT RIGHT: Construction work on the George Westinghouse Bridge at East Pittsburgh, Pa. The immense amount of steel and concrete required for this structure was placed with three cableways equipped with "HERCULES" (Red-Strand) Wire Rope. The Booth and Flinn Company were the builders.



AT LEFT: One of the two shovels operated by E. H. Honnen on his contract for a section of U. S. Highway No. 40 where it crosses the Continental Divide. This entire work was at altitudes of over 9700 feet. Both shovels were equipped with Patent Flattened Strand "HERCULES" (Red-Strand) Wire Rope.

Measure Its Worth by the Yardstick of RESULTS

The fact that "HERCULES" (Red-Strand) Wire Rope has been and is used so extensively by excavating contractors and road builders in all parts of the country, must mean that it gives a good dollar's worth of service for each dollar of its cost.

There are definite reasons, of course, why this wire rope is so dependable and economical, but results are what actually count, so why not give it a chance to show you just what it can do for you? Whether your contracts are large or small, "HERCULES" (Red-Strand) Wire Rope will help you to keep your costs down and your production up.

As wire rope is used for so many different purposes, no one construction is suitable for all of them, consequently "HERCULES" (Red-Strand) Wire Rope is made in a wide range of constructions, including both Round Strand and Patent Flattened Strand types. We shall be glad to help you select the right construction for your conditions.

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How State Highway Departments Call Bids for Cofferdams, Sheeting and Pumping on Bridge Work

(Continued from page 334)

time, and offhand I see no special reason for incorporating a separate item covering this portion of the job, unless some definite rigid specifications are provided so as to make such a scheme readily workable.

While under any method, we have observed that conditions arise from time to time which do not appear to be entirely covered by standard specifications, we feel reasonably satisfied after a number of years of experience that our present practice of calling for lump sum bids on small structures appears to be about as satisfactory a method as we have ever considered.

M. J. HOFFMANN,
Bridge Engineer.

Mississippi . . . . . "Cofferdam, sheeting and pumping" as a separate item in this state.

C. SIMMONS,
Bridge Engineer.

Montana . . . . . we include all necessary bailing, drainage, sheeting and construction of cribs or cofferdams in the item of Structural Excavation.

We see no advantage in adding the separate item for cofferdam, sheeting and pumping. This is one way in which the contractor can prove his efficiency, and if he is able to reuse his materials and can operate his pumps more effectively, that is to his advantage. We specify the results and leave the method and means of construction to the contractor. The smaller the number of items the more easily the results are obtained. On a few instances where we know there are some bad holes and some on which excavation will not be difficult, we have divided the excavation into two classes, specifying exactly which bents or piers are to be included in each item.

In case you receive any arguments in favor of the separate item for cofferdam, sheeting and pumping we would appreciate receiving copies, as we are always interested in letting our work in accordance with the best adopted practice.

B. J. ORNBURN,
Bridge Engineer.

Nebraska . . . . . prescribe unit prices for bridge excavation, and no separate pay items are allowed for pumping, bailing, cofferdams, seals and so forth. We have found this method most satisfactory in that it eliminates controversies over minor points which are difficult of ascertainment.

Quoting from Standard Specifications under the paragraph for excavation for bridges: "It shall also include as found necessary, all clearing and grubbing, all bailing, draining, pumping, sheeting and construction of cofferdams or temporary cribs and their subsequent removal; also the construction of concrete seals if found necessary. Also under Basis of Payment quote: "Payment for all work prescribed under this item and completed and accepted, measured as provided above, shall be made at the contract unit prices bid for unclassified excavation for bridges. Wet excavation for bridges, as the case may be, which prices shall be full compensation for furnishing all materials, for all labor, equipment, tools and incidentals necessary to complete the work."

With the above specification the number of legal questions such as you cite are greatly reduced.

J. G. MASON,
Bridge Engineer.

Nevada . . . . . This Department has found it most satisfactory and has always specified the inclusion of this item as a portion of the item "structure excavation." This has, perhaps, been due to the fact that the ordinary structure encountered in this State requires very little or no sheeting as there are usually definite periods during the year when the flow of water is small enough to be diverted and cause very little trouble to construction activities.

G. R. EGAN,
Chief Draftsman.

New Hampshire . . In New Hampshire it has been the custom to ask for unit price bids on regular items of construction with no separation for an item of cofferdams or pumping it being assumed that the cost of this work should be included either in the excavation price or the foundation concrete price. It has always been our custom to ask for as few lump sum items as possible because we have found that whenever an item calls for a lump sum bid there seems to be such a great variation in the amount offered.

JOHN W. CHILDS,
Deputy Commissioner.

New Mexico . . . In calling for bids on this item of "structure excavation", necessary cofferdams, sheeting, pumping and all other necessary items are included in the unit price. We show test pits on our plans and the borings or soundings. If water is encountered in the test pit or augur sounding we show its level on the plans and the date when found. We furnish this information so the contractor will have all data of which we are in possession.

R. W. BENNETT,
Office Engineer.

New York . . . . It is our practice after determining foundation conditions to determine the elevation of the ordinary water surface during the construction season. If this elevation is such that an earth cofferdam will suffice to construct the substructure, no item for cofferdam is placed in our estimate and the cost of constructing and removing the earth cofferdam and the necessary pumping, bailing and draining is included in the unit price bid for "foundation excavation." There will always be an item of "foundation excavation" in each bridge contract. Usually the excavation below a plane four feet above the base of the substructure is paid for under the item of "foundation excavation." The price estimated for foundation excavation is, of course, greater than that for the highway excavation on account of the greater cost of excavation inside of a cofferdam and the cost of "pumping, bailing and draining."

If the ordinary elevation of the water surface is such that a wooden or steel sheet piling cofferdam is necessary a separate item of "cofferdam, pumping, bailing and draining" is placed in the estimate in addition to the item of "foundation excavation." Should the contractor for some reason or other not construct a timber or steel sheet cofferdam even though there is an item in the contract it is our opinion that there should be no payment made for the item of "cofferdam, pumping, bailing and draining."

H. O. SCHERMERHORN,
Assistant Chief
Engineer.

North Dakota . . . On bridge work we take bids on two excavation items, "Wet Structural Excavation" and "Dry Structural Excavation." A line is shown on the structural plans showing the approximate elevation of ground water or water in the channel. Any excavation below this fixed datum line is paid for as wet and all excavation above this datum line is paid for as dry structural excavation. At the time the work is actually done conditions may vary somewhat from the conditions existing at the time the survey and soundings were taken and on which the datum line is fixed. If the contractor does his work while water conditions are more favorable than he anticipated he gains by our method of payment. But if the reverse is true he loses.

We have never taken bids on "Cofferdams", "sheeting" or "pumping". The contractor estimates his costs and then does his work by the cheapest practical method. We have had quite satisfactory results with our method of taking bids. Taking bids on quantities that may be increased both in amount and cost of doing allows many chances for argument.

J. N. ROHERTY,
Research Engineer.

Ohio . . . . . "Our practice in Ohio is to secure a lump sum bid on this item, listed "Cofferdams, sheeting and pumping" as a separate item, regardless of the size of the bridge job. I have observed that our bids vary widely in the amounts set down for this item, which is not a desirable set up, it must be admitted. After several years during which we published no estimated unit prices for the various items, we began again in 1932 to pub-

lish our unit estimated prices, including our lump sum estimates for such items as are not required to be bid upon by unit prices. Our practice prior to about 1928 had been to publish the estimated unit prices. From 1928 thru 1931 we required unit price bids but we published merely the total estimated price for the improvement.

"The bidding blanks have always required contractors to set down a unit price and make an extension for each item, the unit price governing in case of error in extension. No unit price is asked on items marked "lump sum," and the amounts bid on such items have invariably fallen over wide marks.

"The contractor secures payment on the item "Cofferdams, sheeting and pumping" strictly upon his price bid for it, regardless of contingencies, except upon a related item, foundation excavation, which is separated by the horizontal plane marked by low water into wet and dry excavation. . . .

"Our practice in highway bridge work is to figure each job for steel sheeting. We allow an amount to cover the cost of the steel equal to only 20% of the price delivered on the job. We estimate a salvage of 80%, which is equivalent to five times used for its life. We then add for driving and pulling, 3 to 4 cents per square foot, and for waling and bracing another 3 or 4 cents per square foot. We then total these items and add 20% of this total for pumping.

"We use the same practice as Michigan in computing the height of sheeting—from a plane one foot above the mean between high and normal water to a plane 4 feet below the bottom of foundation masonry as shown on the drawings. Where sheeting is to be left permanently in place we do not figure salvage, the other items remaining as when pulled . . . "

VIRGIL A. EBERLY,
Designing Engineer of Bridges.

Oregon . . . . . Heretofore we have made it a practice to include the cost of all cofferdams, sheeting and pumping in the price bid per cubic yard for structural excavation. In fact, our standard specifications so provide. However, I am of the opinion that the fairest way to treat this matter, especially on jobs where the cofferdams and cribs are of considerable magnitude, is to include a separate item for cofferdams, pumping and sheeting, and in the case of one or two of our larger jobs this year, we contemplate a special provision in the specifications to so provide.

C. B. McCULLOUGH,
Bridge Engineer.

Pennsylvania . . . We in our work divide excavation into two classes. Class one covers road work excavation and Class two excavation includes excavation for structures below the elevation of the finished roadway. It also includes the removal of the old structure including abutments, piers and wings of bridges, culverts and so forth. For this we specify that "No separate compensation will be made for cofferdams, bracing, shoring, pumping or bailing, or for any material used on account of encountering water."

We have experienced no trouble in applying this specification and believe that it works out fairly for both sides of the contract. We also believe that especially for small bridges this method of including the costs of cofferdams and so forth in the bridge excavation item is quite universally applied.

Your letter brings out the point that you are referring to small bridge work. We appreciate that in large or unusual bridges where much cofferdam work is required and where the cost of same might be a major item, then it would be well to separate this item in order to arrive at a clearer understanding as to just how important this particular feature is, in which case the engineering details of this cofferdam would be analyzed subsequent to the construction and every effort made to have it suitable for the purpose intended.

However, in small bridge work such a procedure is hardly necessary and if it were separated in all cases we believe we would be unduly penalized in the way of cost.

SAMUEL ECKELS,
Chief Engineer.

Rhode Island . . . We recognize the question propounded by the Ohio Engineer as one upon which there may be numerous viewpoints. In our practice we do not call for a separate price on cofferdam, sheeting and pumping. It is included in the lump sum bid . . . and presumably is absorbed in the item of bridge excavation, although we feel that some of the cost could be allocated to the masonry from piers and abutments as part of the cost of manipulation. We do not see how a single separate item combining the three principle elements of the underwatering problem would be of any particular advantage or disadvantage to either the contractor or the owner.

D. O. CARGILL,
Bridge Engineer.

South Carolina . . . We do not receive separate bids for this item, but this work is included in our price for wet excavation. We have never had any trouble under this arrangement and if the contractor is lucky enough to get out without cofferdams or sheeting we make no reduction. Although it is our practice to have an item of wet and dry excavation, I understand that the states on each side of us carry all their foundation excavation in the unit price for concrete. At least, I understand, this is the method used on small bridge jobs.

JOS. W. BARNWELL, JR.
Bridge Engineer.

Utah. . . . . Our present specifications provide for "Structural Excavation" to include all labor and materials in connection with any cofferdams, sheeting and pumping that may be necessary in excavating to the required elevations. Up to the present time we have found this specification operates satisfactorily and do not contemplate any change in the near future.

M. HOUSECROFT,
Chief Bridge Engineer.

Vermont . . . . . Absorbed under the item of structural excavation.

A. J. RUMMALS,
Road Engineer

Washington . . . . ordinarily this department does not take bids on these items but these are specified to be included in the price bid for Structure Excavation. Our specifications are practically the same as the specifications of the American Association of State Highway officials.

On especially deep or difficult foundations where steel or concrete sheet piling cofferdams, sunk by the pneumatic process are used, we have taken bids on these items but never on pumping. For all ordinary bridge work we believe it impractical and unnecessary to take bids on these items and have never had any questions raised as to its legality.

The qualified bridge contractor takes the cost of sheeting, cofferdams and pumping into account in figuring his costs on structure excavation and we doubt if there is anything that can be done that will protect incompetent and inexperienced parties from bidding on work at a price that will not permit them a profit on their work.

SAMUEL J. HUMES,
Director of Highways.

West Virginia . . . in some cases we ask for a lump sum bid for cofferdams, which does not include excavation. In practically all cases, we ask for a lump sum bid where there is very little wet excavation. Where we do not ask for a lump sum bid for cofferdams, it is to be included in the excavation for the structure.

L. L. JEMISON,
Bridge Engineer.

He was a bit shy, and after she had thrown her arms around him and kissed him for bringing her a bouquet of flowers, he arose and started to leave.

"I am sorry I offended you," she said.

"Oh, I'm not offended," he replied. "I'm going for more flowers."

Wrangler: "Will this anæsthetic make me sick?"

Doctor: "No, I think not."

Wrangler: "How long will it be before I know anything?"

Doctor: "Aren't you expecting too much of the anæsthetic?"

POSITIONS WANTED

Space under this heading is available at $5.50 per inch or fraction thereof.

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TRANSITMAN — OFFICE WORK

Experienced transitman with mining experience desires transit work, or will work as rodman, chainman or engineer's helper. Have also had experience as timekeeper, and much experience in safety work. Good references. Located Wisconsin, will go anywhere. Box 3513.

SHOVEL OPERATOR

Have 22 years' experience on general excavating and grading projects on gasoline, electric or steam powered machines. Can give best of references and can do own repair work. Will go anywhere. Present location Louisiana. Box 3605.

SHOVEL OPERATOR

12 years' experience on Gas+Air and steam machines on highway grading and basement excavating. Willing to go any place in U.S.A. Married. Can do own repair work and furnish reliable references. Present location, North Carolina. Box 3301.

CLAMSHELL—DRAGLINE OPERATOR

6 years' experience on stripping and loading operations. Prefer operating Bucyrus-Erie dragline anywhere. Can make own repairs and furnish good references. Present location, South Carolina. Box 3501.

DRAGLINE-CRANE-SHOVEL OPERATOR

Over 15 years' experience on gasoline and Diesel machines, large and small in quarries; on steel work; gravel pits and highway work. Willing to go anywhere on any size machine. Can do own repair work and can furnish excellent references. Married. Present location Illinois. Box 3601.

DRAGLINE — SHOVEL — CRANE OPERATOR

Have 100% rating in recent Federal Civil Service examination. Experience covers years on drainage, quarry, highway grading and mine stripping. Willing to go anywhere in U.S.A. Can do own repair work and furnish excellent references. Married. Present location, South Dakota. Box 3502.

SHOVEL OPERATOR

15 years' experience on railroad, highway and general excavating. Willing to go anywhere in U.S.A. Can do own repair work and furnish excellent references. Married. Present location, Illinois. Box 3503.

DRAGLINE OPERATOR

Experience covers 11 years' on Diesel and gasoline draglines on drainage, canal, levee and rock work. Expert gasoline mechanic, can build gasoline engines from the ground up. Willing to go anywhere in U.S.A. Married. 30 years old. Can handle own repair work and furnish A-1 references. Present location, Arkansas. Box 3504.

CRANE-SHOVEL OPERATOR

16 years' of experience operating gasoline and steam machines on highway and rock grading and general excavating. Prefer operating small gas or steam shovel anywhere in the East. Married. Age 36 years. Can do own repair work and furnish first class references. Present location, New York. Box 3303.

SHOVEL OPERATOR

Have ten years' experience on Gas+Air, gasoline and steam shovels. Willing to go anywhere in U.S.A. Married. Best of references. Can do own repair work. Present location, Wisconsin. Box 3203.

DRAGLINE-SHOVEL-CRANE OPERATOR

18 years' on gasoline, gas+air, Diesel and steam machines on general excavating, coal and ore stripping and highway grading. Will go anywhere. Married. A-1 references. Age 38. Present location, Illinois. Box 3404.

EXPERT DRAGLINE AND SHOVEL OPERATOR

16 years' experience as shovel operator. Married, 36 years of age. Have operated practically all makes of machines, and have 10 years' experience as dragline operator. Can handle steam, Diesel, electric or gasoline machine. Have worked on highway and railroad grading, rock excavation in quarry, drainage and irrigation and dredging and also gold dredging. Prefer position on Bucyrus-Erie Diesel, E-2, D-2, or 50-B or other Bucyrus-Erie machines. Have also operated Class 220 and 225 electric and Diesel electric machines. Capable of taking charge of repairing and erecting and can handle crews. Best of references and can do own repairing. At present located in California, but will go anywhere. Box 3305.

DRAGLINE-SHOVEL OPERATOR

14 years' experience on Diesel, gasoline and steam machines on highway grading and levee building. Would like to operate dragline anywhere in U. S. A. Married. Can do own repair work. A-1 references. Present location, Arkansas. Box 3306.

CRANE-SHOVEL OPERATOR

Have 35 years' experience on gasoline and steam machines on highway and railroad grading; canal and quarry rock. Willing to go anywhere in U.S.A. on any size or make shovel. Married. Can furnish the very best of references and can handle own repair work. Present location, South Carolina. Box 3304.

SHOVEL OPERATOR

15 years' experience on electric, Gas+Air and steam machines on basement excavating; highway and railroad grading. Will go anywhere in U.S.A. Married. Age 35. A-1 references. Can do own repairing. Present location Pennsylvania. Box 3604.

DRAGLINE-SHOVEL OPERATOR

Have had thirteen years' experience operating Bucyrus-Erie 20-B, 30-B, 50-B and 175-B steam, Diesel and electric machines. Have built levees, road and railroad embankments; dug canals, gravel and stripped phosphate. Can furnish good references. Willing to go anywhere in U.S.A. or foreign countries. Present location, Louisiana. Box 3402.

DRAGLINE-SHOVEL OPERATOR

8 years' experience on Bucyrus-Erie, Link Belt, Marion and Northwest machines, steam, gasoline and Diesel powered. Have worked on highway and railroad grading, quarry excavation and drainage irrigation. Willing to go anywhere in U.S.A. Also have two years' machine shop experience. Can do own repairing and furnish A-1 references. Present location, Florida. Box 3406.

DRAGLINE OPERATOR

Experienced on 30-B and 50-B Diesel machines, on ditch and levee work. Willing to go anywhere in U.S.A. Single. Age 28. Can do own repair work. Reliable references. Present location Kentucky. Box 3603.

SHOVEL OPERATOR

18 years' experience on Erie, Osgood, Thew and Marion machines on highway, basement, railroad and general excavating. Willing to go anywhere. Can take complete charge of repairing. A-1 references. Present location, Ohio. Box 3509.

DRAGLINE — SHOVEL OPERATOR

Experience covers 15 years' on Diesel, gasoline and steam machines on drainage and levee work, pit work, and highway grading. Prefer dragline work anywhere in U.S.A. Can do own repairing. Married. Present location, Iowa. Box 3510.

DRAGLINE—CRANE—SHOVEL OPERATOR

16 years' experience on drainage work, railroad and highway grading. Will go anywhere on any type and make machine. Can do own repair work. Married. Present location, Indiana. Box 3511.

DRAGLINE—CLAMSHELL—SHOVEL OPERATOR

18 years' experience on electric, gasoline, Diesel and steam machines on all classes of work. Will go anywhere in U.S.A. Can do all own repair work. Married. Reliable references. Present location, Illinois. Box 3512.

DRAGLINE-CLAMSHELL-SHOVEL OPERATOR

22 years' experience on Gas+Air, gasoline and steam machines on highway, coal stripping operations, irrigation work, pile driving and many other miscellaneous jobs. Will go anyplace in U.S.A. Can handle own repair work. Married. Can furnish excellent references. Present location, New York state. Box 3405.

DRAGLINE-CLAMSHELL OPERATOR

Experience covers years on Diesel and gasoline machines on levee and highway work. Willing to go anywhere in U.S.A. Single. Age 27. Can do own repair work and furnish reliable references. Present location, Louisiana. Box 3403.

SUPERINTENDENT-DRAGLINE OPERATIONS

Have superintended dragline and shovel work for many years on mining operations of various types, also rock quarries. Willing to go anywhere in U.S.A. 43 years old. Have excellent references regarding character and ability. Present location, Tennessee. Box 3211.

DRAGLINE OPERATOR

18 years on Diesel, gasoline and steam draglines on levees and canals. Will go anywhere on any make and model machine. Married. Can handle own repairing. Reliable references. Present location, Louisiana. Box 3508.

CLAMSHELL-SHOVEL OPERATOR

Experience covers twenty-one years in quarry, sand and gravel loading. Prefer operating Bucyrus-Erie steam shovel in central states. Can do own repair work. Excellent references furnished. Married. Present location, Ohio. Box 3208.

SHOVEL OPERATOR

Have 13 years' experience on Diesel, gasoline, Gas+Air, electric and steam machines on highway and railroad grading, quarry work and general excavating. Married. Willing to go anywhere. Can do any repair and service work. Familiar with Diesel engines. Reliable references. Present location, Tennessee. Box 3307.

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Wanted—Bachelor job as hopper operator on road work. Fully experienced on all types of highway building. Can also serve as tractor operator. Single. 30 years old. Willing to go anywhere in U.S.A. Reliable references furnished. Present location, Indiana. Box 3308.

DRAGLINE-CRANE-SHOVEL OPERATOR

Experience covers eighteen years on large and small gasoline, Diesel and steam machines on general excavation, scow loading, lock and dam excavating. Willing to go anywhere on large or small machine. Married. Can furnish excellent recommendations. Fully capable of handling any repair work on machines. Present location, Illinois. Box 3206.

CLAMSHELL-CRANE-SHOVEL OPERATOR

Experienced on Gas+Air and steam machines on general construction work. Willing to operate anywhere in U.S.A. Married. Can handle own repairing. A-1 references furnished. Present location North Carolina. Box 3602.

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Over 25 years' experience on all types of shovel, cranes, locomotives on general construction work. Capable of taking full charge of crew. At present located in Australia. Available for work in New Zealand, China or Federated Malay States. Can furnish excellent recommendations. Address replies to W. J. A., 22 Ruthven Street, Waverly, N. S. Wales, Australia.

DRAGLINE-SHOVEL OPERATOR

Have twelve years' experience on Bucyrus-Erie, Monighan, Marion, Osgood, Northwest, Koehring, Link-Belt and P. & H. shovels and draglines—steam—Diesel and gasoline on drainage, quarry and ore pits and on general excavating. Willing to go anywhere in U.S.A. or foreign countries. Can do own repairing and furnish reliable references. Present location, Indiana. Box 3401.

SHOVEL OPERATOR

Have operated Bucyrus-Erie 320-B and 750-B electric stripping machines for past seven years. Willing to go anywhere in U.S.A. Can do own repair work and furnish A-1 references. Married. Present location, Illinois. Box 3505.

CLAMSHELL—CRANE—SHOVEL OPERATOR

Experience includes 14 years on gasoline, electric and steam machines on all types of excavating. Willing to go anywhere on any type machine. Can do own repair work and furnish reliable references. Single. Present location, Pennsylvania. Box 3506.

CLAMSHELL — CRANE OPERATOR

Have 14 years' experience on steam machines on all types of general excavating. Will go anywhere on any kind of work. Can do own repairing and furnish excellent references. Married. Present location South Carolina. Box 3507.

DRAGLINE-SHOVEL OPERATOR

Experienced on Bucyrus-Erie D-2 and 30-B Diesel machines, on highway grading and canal drainage. Will go anywhere. Married. Age 37. Reliable references furnished. Can handle own repair work. Present location, Kentucky. Box 3204.

TRADE NOTES

One of the pioneer wire rope manufacturers who has always been a strong advocate of high quality, and who likewise has been consistent in making notable advancements in its industry, is this year celebrating its 75th anniversary. This is the **A. Leschen & Sons Rope Company of St. Louis, Mo.**

An early, and one of the most important developments made by the Leschen Company, was in 1886 when it introduced its "Hercules" grade of wire rope. Prior to that time the plow steel grade of wire rope was considered the best that could be produced. Mechanical logging was then making its appearance, as well as were dredging machines—and it was to meet the requirements of this heavy-duty equipment that this new and higher quality wire rope was developed. In order that this new grade of rope could be identified by appearance, they originated the idea of coloring one of its strands—red being used.

It was not long after the introduction of "Hercules" (Red-Strand) Wire Rope that many new types of wire rope using machines were put on the market, and almost invariably each new machine was designed with a greater capacity than its predecessor, which situation led to another forward step by the Leschen Company when in 1894 they began the manufacture of wire rope in the Patent Flattened Strand construction. This construction, according to the manufacturer, provides greater resistance to wear and crushing, and it also develops greater strength.

It has long been apparent to the Leschen Company that no one design of wire rope is suitable for all the conditions under which it is called upon to work, consequently this company probably manufactures wire rope in a wider range of constructions and types than any other manufacturer.

The first Leschen wire rope was made by hand and an open field was the factory. Now the Leschen plant covers many acres, and the hand method has long since given way to modern machines.

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LIMA 101, 1¼-CUBIC-YARD GASOLINE ROPE CROWD SHOVEL. Electric starter and lights. Shipped from factory late 1930. Excellent condition. Will rent. Box 322-SS.

MARION MODEL 36 STEAM STRIPPING SHOVEL, shop number about 4100, 30-foot boom, 18-foot 6-inch dipper handle, 2-cubic-yard dipper, caterpillar mounted. Located near Isabel, South Dakota. Approximately $2000.00 worth of spare parts included. Immediately available. Priced to sell. Box 233-SS.

P&H MODEL 204. Shop number above 2200 combination Shovel Clamshell. 19' shovel boom, 14'6" dipper handles, ½ cubic yard dipper, 35' clamshell boom, ½ cubic yard Owen Type M digger type bucket. Both front end equipments less than one year old. Excellent condition. Box 254-SS.

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BUCYRUS-ERIE 20-B DIESEL, 40-foot dragline boom and extra high lift shovel attachment. ¾-cubic-yard Type "S" Page bucket.

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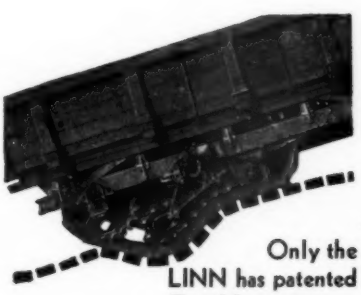

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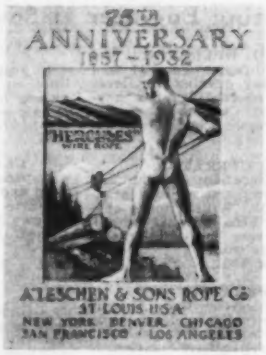
For your convenience in writing to Linn Manufacturing Corporation you will find a card bound in this issue.

TRADE NOTES

One of the pioneer wire rope manufacturers who has always been a strong advocate of high quality, and who likewise has been consistent in making notable advancements in its industry, is this year celebrating its 75th anniversary. This is the **A. Leschen & Sons Rope Company of St. Louis, Mo.**



An early, and one of the most important developments made by the Leschen Company, was in 1886 when it introduced its "Hercules" grade of wire rope. Prior to that time the plow steel grade of wire rope was considered the best that could be produced. Mechanical logging was then making its appearance, as well as were dredging machines—and it was to meet the requirements of this heavy-duty equipment that this new and higher quality wire rope was developed. In order that this new grade of rope could be identified by appearance, they originated the idea of coloring one of its strands—red being used.

It was not long after the introduction of "Hercules" (Red-Strand) Wire Rope that many new types of wire rope using machines were put on the market, and almost invariably each new machine was designed with a greater capacity than its predecessor, which situation led to another forward step by the Leschen Company when in 1894 they began the manufacture of wire rope in the Patent Flattened Strand construction. This construction, according to the manufacturer, provides greater resistance to wear and crushing, and it also develops greater strength.

It has long been apparent to the Leschen Company that no one design of wire rope is suitable for all the conditions under which it is called upon to work, consequently this company probably manufactures wire rope in a wider range of constructions and types than any other manufacturer.

The first Leschen wire rope was made by hand and an open field was the factory. Now the Leschen plant covers many acres, and the hand method has long since given way to modern machines.

FOR SALE

Space under this heading is available at the following rates, payable in advance of publication:

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The price per inch is based on total space used—multiply ad. space by number of continuous insertions.

Address all box numbers c/o The Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards

ERIE TYPE B-2 high lift steam shovel, "Cat" mounted. Good operating condition. Will rent. Priced to sell. Box 286-SS.

TYPE B-2 STEAM SHOVEL, number 9830, mounted on single shaft caterpillar-type mounting. Equipped with 21-foot 3-inch boom, 16-foot dipper handle, ⅞-cubic-yard inserted tooth dipper. Boom hoist and Mass. standard boiler. Located vicinity of Boston. Reasonably priced. Box 345-SS.

BUCYRUS-ERIE brand new 1035 gasoline shovel, rope or chain crowd. Also clamshell or dragline equipment. At price you cannot refuse to consider. Box 356-SS.

BUCYRUS 20-B steam shovel ¾-yd. Dipper. $1800.00. Box 348-SS.

TYPE "B" ERIE STEAM SHOVEL, caterpillar mounted, 19-foot 9-inch boom, 16-foot dipper handle, ¾-yard dipper, boom hoist. New 1924. Excellent condition; new flues in boiler last season; did no work last year. Located near Chicago. Priced to sell. Box 157-SS.

BUCYRUS-ERIE SLIGHTLY USED — Factory guaranteed 1¼-cubic-yard High Lift straight gasoline shovel. Box 354-SS.

P. & H. MODEL 206 Gasoline Combination Shovel and Clamshell machine. Good condition. Located vicinity Chicago. Box 336-SS.

THEW "O" ¾-cubic-yard gas shovel rebuilt 1931 and mounted on new center drive "cat". Box 343-SS.

BUCYRUS-ERIE 1035 gasoline shovel. Kohler light plant. Less than year old. Good condition. Priced to sell. Box 355-SS.

MARION MODEL 21 AC-DC electric shovel. Shop number about 5500, 20-foot boom, 15-foot dipper handle, ¾-cubic-yard dipper. Suitable to operate on power-supply 3-phase 60-cycle 220 or 440 volt. First class condition. Box 208-SS.

ORTON SHOVEL, new 1928. 16-foot 4-inch boom, 12-foot dipper handle. ⅝-cubic-yard dipper. Box 100-SS.

LORAIN 55 Gasoline one cu-yd. Shovel, new April 1929. Excellent condition. Box 270-SS.

OSGOOD GASOLINE ONE-CUBIC-YARD COMBINATION SHOVEL-CLAMSHELL-DRAGLINE. Six cylinder Beaver motor. Overhauled late 1931. Bargain price. Box 323-SS.

UNIT MODEL B three-quarter swing, ¾-cubic-yard Shovel. New 1928. Excellent Condition. Box 350-SS.

BUCYRUS-ERIE USED 20-B gasoline shovel. Good condition. Box 353-SS.

BUCYRUS-ERIE 32-B gas shovel, slightly used. Bargain. Will rent. Box 341-SS.

MARION 450 caterpillar mounted steam shovel, 6000 series, 20-foot boom, 15-foot dipper stick, one-yard dipper, 3½-years old. Located in Reading. Price $3,000. Box 334-SS.

BUCYRUS-ERIE TYPE GA-2, EXTRA HIGH LIFT, GAS+AIR SHOVEL, shop number 10509, steel cab, mounted on single shaft drive caterpillars, equipped with 24-foot boom, 18-foot dipper handle, one-cubic-yard dipper. Located in Central Michigan. A real bargain at $4800.00. Box 333-SS.

ERIE TYPE "GA-3" GAS+AIR SHOVEL, shop number 4117, mounted on spur gear drive caterpillar trucks, and equipped with a 24-foot boom; 18-foot, 4-inch dipper handle; 1-cubic-yard manganese cast front socket inserted tooth dipper; power boom hoist; air self-starter, and all equipment and appurtenances in accordance with the specifications of the Bucyrus-Erie Company, f.o.b. cars shipping point Virginia. Box 126-SS.

USED BUCYRUS 30-B DIESEL SHOVEL—25'9" Boom, 14' Dipper Handle, including Dragline Equipment. Box 251-SS.

ERIE REBUILT B-2 standard steam shovel, power boom hoist, new style "Cats." Factory guaranteed. Box 252-SS.

ERIE TYPE-B high lift steam shovel rebuilt July 1931 including new boiler. Since used 4 months. Excellent condition. Will rent. Box 285-SS.

REBUILT GA-2 ERIE SHOVEL mounted on new single shaft caterpillar, 1¼-cubic-yard inserted tooth dipper, 22-foot 6-inch boom, 16-foot dipper handle, starter. Carries guarantee of new machine. Box 42-SS.

NORTHWEST SHOVEL, model 105, caterpillar mounted, 24-foot boom, 1-cubic-yard dipper, 16-foot dipper handle. In good condition. Price $4,500, f. o. b. Utica, New York. Box 34-SS.

FIVE TYPE A BUCYRUS-ERIE STEAM SHOVELS. Good value. $500 each.

FOUR TYPE B BUCYRUS-ERIE STEAM SHOVELS. Good operating condition. $1000 each. Box 328-SS.

BUCYRUS-ERIE 41-B steam. 50-foot boom. Specially arranged for pile driving service. Will rent. Box 342-SS.

ERIE GAS+AIR Combination high lift shovel and dragline equipment. Chain drive. "Cats." Very good condition. Located vicinity Chicago. Box 337-SS.

ERIE TYPE B-2 STANDARD STEAM SHOVEL, "Cat" mounted. Located near New York City. Will rent. Box 317-SS.

USED TYPE "O" THEW STEAM SHOVEL, shop number about 2100; 20' boom, 16' dipper handle, ¾-yd. dipper. Good running condition. Located Milwaukee vicinity. Bargain. Box 261-SS.

LIMA 101, 1¼-CUBIC-YARD GASOLINE ROPE CROWD SHOVEL. Electric starter and lights. Shipped from factory late 1930. Excellent condition. Will rent. Box 322-SS.

MARION MODEL 36 STEAM STRIPPING SHOVEL, shop number about 4100, 30-foot boom, 18-foot 6-inch dipper handle, 2-cubic-yard dipper, caterpillar mounted. Located near Isabel, South Dakota. Approximately $2000.00 worth of spare parts included. Immediately available. Priced to sell. Box 233-SS.

P&H MODEL 204. Shop number above 2200, combination Shovel Clamshell. 19' shovel boom, 14'6" dipper handles, ½ cubic yard dipper, 35' clamshell boom, ½ cubic yard Owens Type M digger type bucket. Both front end equipments less than one year old. Excellent condition. Box 254-SS.

FOR SALE OR RENT

BUCYRUS-ERIE 20-B DIESEL, 40-foot dragline boom and extra high lift shovel attachment. ¾-cubic-yard Type "S" Page bucket.

Box 67-SS.

FOR SALE

Address all box numbers c/o The Excavating Engineer at South Milwaukee, Wisconsin

Small Shovels
Under 2 Yards
Continued

ONE P&H MODEL, 208, 45' boom, dragline (no bucket). "Cats" 15½' long, 9' wide, 22" treads, 100 H.P. Waukesha High Altitude Engine. Box 249-SS.

MARION 21 Steam ¾-cubic yard steam shovel. Box 344-SS.

OSGOOD "CONQUEROR" 1-cubic-yard gasoline shovel. 6 cylinder Le Roi Engine. Starter battery lighting system. Good condition. Box 240-SS.

ERIE GAS+AIR HIGH LIFT SHOVEL. Reported in good operating condition. Located southern Michigan. Box 338-SS.

BUCYRUS-ERIE TYPE 1020, ½-cubic-yard chain crowd shovel. "Cat" mounted. Electric starter. Used about four months. Condition good as new. Bargain. Box 321-SS.

BUCYRUS-ERIE TYPE D-2 DIESEL DRAGLINE, shop number 5055, 45-foot boom and 1-cubic-yard Page Class "M" drag bucket. Located McGehee, Arkansas. Priced to sell. Box 166-SS.

USED BUCYRUS TYPE 18-B ⅝-yd. steam shovel mounted on traction wheels. Located Southern Wisconsin. Bargain. Box 259-SS.

USED NORTHWEST SHOVEL, 24-foot boom, 15-foot dipper handle, 1-cubic-yard dipper, equipped with 4-cylinder, 6¼ in. x 8¼ in., Atlas Diesel Engine. Good operating condition. Price right. Box 135-SS.

BUCYRUS-ERIE D-2 DIESEL RECONDITIONED AND GUARANTEED 1-cubic-yard shovel and 40-foot boom dragline equipment. Box 234-SS.

BUCYRUS-ERIE 41-B 1¼ cubic-yard steam shovel. Will demonstrate. Box 280-SS.

20-B BUCYRUS STEAM SHOVEL, shop number 3743, caterpillar mounted, 20-foot 6-inch boom, 15-foot dipper handle, ¾-cubic-yard dipper. Located near Chicago. Priced to sell. Box 210-SS.

BARGENT JUNIOR 36-foot boom dragline. Full swing. "Cat" mounted. Also ¾-cubic-yard drag bucket. New February 1929. Box 292-SS.

BYERS BEARCAT, Model 27, gasoline ½-cubic-yard Skimmer scoop, crane-clamshell and drag shovel with front opening dipper. Engine—4-cylinder, 4"x5" Hercules Model OX. Machine new July 1928. Excellent condition. Box 293-SS.

Bay City Model K-Gasoline Combination ½-cubic-yard Shovel and Clamshell machine including Blaw-Knox ½-cubic-yard Bucket, Good condition. Box 300-SS.

FOR SALE—AMERICAN STEAM DITCHER, equipped with ¾-cubic-yard bucket, mounted on flange wheels for off the car service and including caterpillar mounting. Machine in excellent mechanical condition. Located in Southeastern Arkansas. Box 159-SS.

RECONDITIONED TYPE-A ERIE STEAM SHOVEL on caterpillars, ⅝-cubic-yard dipper, 16-foot boom, 13-foot dipper handle, boom hoist, Massachusetts boiler. Machine thoroughly inspected, worn parts replaced. Guaranteed to be in first class operating condition. Will rent or sell. Box 37-SS.

TYPE E-2 DIESEL DRAGLINE, caterpillar mounted with 30-inch treads; 4-cylinder 8" x 10½" Atlas Diesel engine. Machine originally shipped in October 1929 and is in excellent condition. May be inspected. Working daily. Located near Vincennes, Ind. Shop number about 10450. Box 224-SS.

USED BUCYRUS TYPE 30-B STEAM COMBINATION EXTRA HIGH LIFT SHOVEL, Clamshell, Dragline, also Sewer Dipper Handle; caterpillar mounted; machine shipped new in 1923. In very excellent condition; has not been used very much, and has been well kept up. Located Chicago vicinity. Box 258-SS.

Model No. 301 Koehring 1-yard gas shovel on Caterpillar, first-class condition. Box 309-SS.

P&H MODEL 600. New 1929. 20-foot shovel boom, 14-foot 3-inch Dipper handle, 1-yard Dipper. Also 40-foot boom Clamshell Dragline Equipment. Waukesha 75 H.P. Engine. Box 218-SS.

USED B-2-ERIE STEAM SHOVEL, 19-foot 9-inch boom, 16-foot dipper handle, ¾-cubic-yard dipper, "cat" mounted, mass boiler, low clearance, wood cab, armored rear end. Located Boston. Good operating condition. Priced right. Box 206-SS.

TWO TYPE "B" ERIE STEAM MACHINES, mounted on "cats," ¾-cubic-yard dippers, shop numbers 2300 and 2301, 19-foot booms and 16-foot dipper handles. Box 83-SS.

BUCYRUS 30-B DIESEL Shovel No. 4008, 25-foot 9-inch Boom, 14-foot Dipper Handle, one-yard Dipper. Good operating condition. Price $3,000.00. Box 217-SS.

USED BUCYRUS TYPE 30-B STEAM SHOVEL; caterpillar mounted; 26' boom and 3' extension. 19' dipper handle, 1-yd. rock dipper, and boom hoist. Located Chicago vicinity. Box 260-SS.

BRAND NEW BUCYRUS-ERIE GA-2 SHOVEL. 22-foot 6-inch boom, 16-foot Dipper Handle, 1¼-cubic-yard Inserted Tooth Dipper, 6¼-inch x 8-inch Waukesha Engine, Air-cooled Compressor, Air Starter. Machines used for demonstration purposes only. Carries full new machine guarantee. Priced to sell. Box 219-SS.

If You Do Not Find What You Want Listed—Write Us
The Excavating Engineer
South Milwaukee, Wis.

BUCYRUS-ERIE SLIGHTLY USED GASOLINE ½-CUBIC-YARD chain crowd high lift shovel. Latest design throughout. Box 289-SS.

20-B BUCYRUS GAS COMBINATION SHOVEL AND DRAGLINE (not including bucket). Shop number 4316. Price $4,000. Box No. 203-SS.

MARION TYPE 32 FULL REVOLVING STEAM SHOVEL, shop number 4639, mounted on four belt caterpillar type mounting and equipped with standard boom and dipper handle and 1¼-cubic-yard dipper. Shipping point western Virginia.
This machine should be an excellent purchase at the price offered, for quarry or slag bank operation. Box 212-SS.

INSLEY ¼-CUBIC-YARD SHOVEL, full-revolving. Shop number about R-200 (2 years old). Machine in excellent condition. Has had best of care. Located in Wisconsin. Box 238-SS.

20-B BUCYRUS STEAM SHOVEL, serial number 4000; caterpillar mounted; 18-foot boom, 12-foot 6-inch dipper handle, 1-yard dipper; shipped new in 1923; located western Missouri. Bargain. Box 241-SS.

BUCYRUS-ERIE 1030, ¾-cubic-yard rope crowd gasoline shovel. Factory rebuilt and guaranteed. Box 283-SS.

TYPE B ERIE COMBINATION HIGH LIFT STEAM SHOVEL, 19-foot 8-inch boom, 16-foot dipper handle, ¾-cubic yard dipper, power boom hoist, and 36-foot boom clamshell equipment complete. Located central Indiana. Price as is, f.o.b. present location $2,000. Box 311-SS.

TYPE "A" ERIE STEAM SHOVEL, shop number about 1900, caterpillar mounted, 16-foot boom, 14-foot dipper handle, ⅝-cubic-yard dipper, boom hoist. In first-class condition. Located Chicago vicinity. Priced to sell. Box 69-SS.

ERIE TYPE B STEAM COMBINATION SHOVEL AND CLAMSHELL. "Cat" mounted. Located Murphysboro, Illinois. Good operating condition. Priced to sell. Box 314-SS.

MARION MODEL 32, shop No. 5459, mounted on "cats," steam-powered, 1¼-cubic-yard dipper, 24-foot boom, 17-foot 6-inch dipper handles. Box 82-SS.

BUCYRUS-ERIE B-2 HIGH LIFT SHOVEL. Shop number above 10,000. New style "Cats." Cab armored two sides and rear. Roof reinforced. Has been thoroughly reconditioned. Located vicinity Louisville, Kentucky. Price f. o. b. cars present location $7500.00. Box 223-SS.

REBUILT TYPE B HIGH LIFT ERIE STEAM SHOVEL. Brand new boiler. Brand new cab. Power boom hoist. "Cat" mounted. Carries same guarantee as new machine. Box 315-SS.

ONE 18-B BUCYRUS, ⅞-yard dipper on full revolving caterpillars. Box 182-SS.

MARION STEAM SHOVEL, MODEL No. 31, high lift boom, and forward drum, boiler just retubed, location near Baltimore, in excellent condition. Price $3,500.00. Address Box 267-SS.

ONE P. & H.-400 ¾-CUBIC-YARD GAS SHOVEL—shop number about 3650, equipped with oversize motor and reinforced boom. Machine is 1½ years old, and has seen very little service. Located in Southern Wisconsin. Box 98-SS.

THEW TYPE "O" Gasoline ¾-cubic-yard shovel. Center drive Caterpillar. Box 329-SS.

BUCYRUS-ERIE SLIGHTLY USED ½-CUBIC YARD Rope crowd gasoline shovel. Will demonstrate. Box 282-SS.

Two 20-B Bucyrus steam shovels. Located Aurora, Illinois. Price each $1500.

30-B Bucyrus steam shovel. Located Charleston, Mississippi. Price $1500. Box 303-SS.

Small Draglines
Under 2 Yards

30-B DIESEL DRAGLINE with 40-foot boom and 1-cubic-yard bucket located in Alabama. Box 91-SD.

MONIGHAN DRAGLINE, 60-foot boom, mounted on 1-W walker and 1¼-cubic-yard Page bucket. Good condition. Price right. Box 339-SD.

A GOOD BUY
TWO P. & H. MODEL 206 DRAGLINES, ¾-yard capacity. 50-foot and 45-foot booms. Three buckets. In first-class condition.
JAMES STEARNS
Antioch, Illinois

P & H DRAGLINE MODEL 700; number 2456 equipped with a 50-foot boom, light 1½-cubic-yard drag bucket, electric light plant, and powered with a Waukesha gasoline engine. About 2½ years old. Box 190-SD.

BUCYRUS-ERIE D-2 DIESEL one-cubic-yard shovel. Also 40-foot boom dragline equipment. Reconditioned and carries new machine guarantee. Box 234-SD.

FOR SALE

Address all box numbers c/o The Excavating Engineer at South Milwaukee, Wisconsin

Small Draglines
Under 2 Yards
Continued

BUCYRUS-ERIE SLIGHTLY USED 32-B Gasoline 45-ft. boom dragline and 1-yd. Page bucket. Like new. Box 352-SD.

P & H MODEL 700 DRAGLINE; number 2894 equipped with a 50-foot boom, light 1½-cubic-yard drag bucket, electric light plant, and powered with 4-cylinder Atlas Diesel engine. About 2½ years old. Box 189-SD.

WANTED TO BUY

GOOD USED DRAGLINE ATTACHMENT complete with bucket for converting Gas +Air shovel. Address Box 169-SD.

FOR SALE OR RENT

One practically new Bucyrus-Erie Model E-2 Dragline, Diesel driven, equipped with 50' boom and 1½-yard Omaha dragline bucket, now located at Shenandoah, Iowa. Box 244-SD.

BUCYRUS-ERIE E-2 DIESEL DRAGLINE, caterpillar mounted, 50-foot boom, 1¼ cubic-yard Omaha bucket, Kohler lighting plant. Machine was new in July 1930 and has been used less than 6 months. 243-SD.

BUCYRUS 20-B COMBINATION GAS DRAGLINE AND SHOVEL (not including bucket). Shop number 4316. Price $4,000. Box 203-SD.

ONE-YARD OSGOOD gasoline combination Dragline-Shovel-Clamshell. Overhauled late in 1931. Six cylinder Beaver motor. Bargain price. Box 323-SD.

ERIE GAS+AIR combination high lift dragline and shovel. Chain drive. "Cats." Excellent condition. Located vicinity Chicago. Box 337-SD.

Small Clamshells and Cranes
Under 2 Yards

LITTLE GIANT CRANE—Gas—Caterpillar Model C. Type B—¾-yd. bucket. Cost approx. $9000. Recently overhauled. Now working. $1800.00.

BROWNHOIST CRANE — Gas — Cats. Model 2-C Serial No. 8829. 1-yd. bucket. Cost $9000. Good working condition. $1800.

McMYLER MODEL J. LOCOMOTIVE CRANE—35 Ton Steam. 50 and 75-ft. Boom. 1½ or 2-yd. buckets. New boiler and swinging engine recently installed. A real crane for long reach and heavy work. Overhauled condition. $4000.00.

NORTHWEST GAS CATERPILLAR COMBINATION SHOVEL & CRANE. ¾-yd. Clam Dipper and 42-ft. Boom. Climax engine in good condition. Rest of machine needs repairs. Also shovel attachments and ¾-yd. dipper. Price as is—$800.00.

BYERS TRUCKRANE—One-half circle swing—handles ½-yd. Clamshell. Needs some repairs. $500.00.

Box 346-SCC.

O. & S. STEAM LOCOMOTIVE CRANE, shop number about 48200, 22-ton capacity, 45-foot box-type boom, 1½ yd. Williams "Rehandler" clamshell bucket; complete, in good working condition. Price, $3,800 f.o.b. near Sioux Falls, S. Dakota. Box 277-SCC.

BROWNING STEAM LOCOMOTIVE CRANE (20-ton capacity). 42-foot boom, 1¼ yd. clamshell bucket. Boiler 43"x96". R. R. truck mounting. Shop No. about 1850. Located Chicago. Bargain. Box 278-SCC.

REBUILT GA-2 ERIE, 40 or 45-foot boom clamshell, mounted on new single shaft caterpillar. Starter. Carries guarantee of new machine. Box 43-SCC.

OSGOOD ONE-YARD GASOLINE combination clamshell-dragline-shovel. Equipped with six cylinder Beaver motor. Overhauled late 1931. Attractively priced. Box 323-SCC.

SPEEDER GASOLINE, 30-foot boom clamshell and ½-yard Erie Peerless bucket. Bargain. Box 324-SCC.

NORTHWEST MODEL 104, combination 45-foot boom clamshell and dragline. Will handle 1¼ cubic-yard bucket. Also 1¼ cubic-yard Pull shovel attachment. Shop number around 1800. Good condition. Will demonstrate. Priced to sell. Box 297-SCC.

GENERAL 35-FOOT BOOM CLAMSHELL MACHINE and ½-cubic-yard Lakewood bucket. Equipped with four cylinder Buda gasoline engine. Machine new September 1929. Box 335-SCC.

P. & H. MODEL 206 combination clamshell and shovel. Located near Chicago. Good condition. Box 336-SCC.

Large Shovels and Draglines
2 Yards and Over

175-B BUCYRUS STEAM SHOVEL, equipped with 75-foot boom, 48-foot dipper handle and 4-yard dipper. Machine located near Pittsburg, Kansas, and can be inspected at any time. Condition good; price open. Box 118-LSD.

175-B STEAM SHOVEL, equipped with 75-foot boom, 48-foot handle, and 4-cubic-yard dipper. Recently rebuilt and in first-class condition, located in Southern Indiana. Priced for quick sale. Box 85-LSD.

If You Do Not Find What You Want Listed—Write Us

The Excavating Engineer

South Milwaukee, Wis.

BUCYRUS-ERIE SHOP REBUILT 100-B STEAM SHOVEL; shop number 4890; 29-foot 6-in. boom; 20-foot handle; three-cubic-yard dipper. Can be inspected at So. Milwaukee, Wis. Priced to sell. Box 187-LSD.

68-C BUCYRUS ELECTRICALLY OPERATED SHOVEL, equipped with 2½-yard manganese front dipper, 3 phase, 60-cycle, 440-volt motors, transformers, cable reel and approximately 1400 feet of cable, all in excellent condition. Reasonable price. Address Box 265-LSD.

AT A SACRIFICE

Two Bucyrus 70-C Railroad Type Shovels, Two 40-Ton Shay Locomotives. All in good condition at a sacrifice. Box 302-LSD.

50-B STEAM SHOVEL; shop number about 4300; equipped with 30-foot boom, 19-foot handle, 2-cubic-yard coal loading dipper, and electric light plant. Excellent condition. Location Southern Illinois. Priced to sell. Box 191-LSD.

What Do You Bid On a

70-C STEAM SHOVEL located near Marietta, South Carolina, where it completed a railroad job? Bargain as supplementary shovel or as supply of spare parts.

88-C STEAM SHOVEL located in Kansas. Carefully laid up after completing season's work. 3½-yard dipper. Fine condition. Any reasonable offer accepted. Box 52-LSD.

CLASS-24 BUCYRUS-ERIE STEAM DRAGLINE, shop number 912; 115-foot boom, 3½-cubic-yard Page bucket. Florida location. Box 73-LSD.

50-B DIESEL DRAGLINE; equipped with 50-foot boom, electric light plant, mounted on "cats." Located Vincennes, Indiana. Can be seen at any time. New, August 1927. Asking $12,000. Box 78-LSD.

DIRT CHEAP

Having bought at public auction one Bucyrus 225-B steam shovel, located near Nonnel, Kentucky, I am prepared to sell the same for cash or on terms, dirt cheap, as is and where is. No reasonable offer refused. Inquiries solicited. Box 211-LSD.

2½-YD. DRAGLINE

Class 220 Page Dragline; 100 H.P. Charter-Horizontal Twin Cylinder engine; 72-foot boom; 2½-cubic-yard Page bucket. Located Northwestern Indiana. Box 200-LSD.

50-B STEAM SHOVEL, Number 3946; equipped with 1½-cubic-yard dipper, 26-foot boom, also 1½-cubic-yard dragline bucket with 50-foot boom caterpillar mounted, equipped for burning oil, located at Texarkana, Ark. Price very reasonable. Box 112-LSD.

For Sale or Rent

ONE CLASS-14 STEAM DRAGLINE excavator Number 3402, 70-foot boom, 2-cubic-yard bucket, caterpillar mounted, equipped for burning gas or oil. Priced very reasonable. Located at Grand Prairie, Texas. Box 110-LSD.

BUCYRUS-ERIE 50-B Steam Shovel. Repossessed. Practically new. Located central Pennsylvania. Box 330-LSD.

6-YD. SHOVEL

BUCYRUS-ERIE 320-B electric shovel, Ward-Leonard control, 3 phase, 60 cycle, 2300 volts, equipped with 6-cubic-yard dipper, 85-foot boom and 58-foot handles. Is in good condition and may be inspected in operation. Reasonably priced. Box 279-LSD.

CLASS-24 STEAM, OIL-BURNING DRAGLINE. 100-foot boom. Have also supply of new parts, including 600 new gum rollers. Reasonably priced, subject to buyer's inspection at Chelan, Washington. Box 51-LSD.

3-YD. SHOVEL

BUCYRUS 78-C, caterpillar mounted; three-cubic-yard dipper; shop number 3611. Boom rebuilt last year. Equipped with new 103-C boiler and will pass boiler inspection in any state. Shovel is in very good condition and is in operation at present time. Box 326-LSD.

50-B BUCYRUS-ERIE ELECTRIC SHOVEL, equipped with 3-phase A. C. current, 550 volts, 60 cycle and has three motors. New Manganese steel dipper. Located South Carolina. Box 226-LSD.

FOR SALE

Address all box numbers c/o The Excavating Engineer at South Milwaukee, Wisconsin

Large Shovels and Draglines
2 Yards and Over
Continued

175-B STEAM SHOVEL No. 4090, equipped with 75-foot boom, 48-foot dipper handle and 3½-cubic-yard dipper. Machine is in very good condition. Oversize boiler. Box 148-LSD.

50-B STEAM DRAGLINE, shop number about 4157, mounted on caterpillars and equipped with 50-foot boom and 10-foot extension. One-yard Williams Clamshell bucket and 1½-cubic-yard Page Class-C drag bucket, boiler retubed and machine equipped with electric light plant. Good working condition, location Detroit District, and ready for prompt delivery. Box 129-LSD.

DIESEL-ELECTRIC DRAGLINE

Class 14 Diesel electric dragline Shop Number 5079, new fall of 1927 with 60-foot boom, 2-cubic-yard bucket, and with extra 10-foot extension, western location. Box 296-LSD.

BUCYRUS 320-B STEAM STRIPPING SHOVEL, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

MONIGHAN DRAGLINE MODEL T, 2-cubic-yard 60-foot boom located near Wichita, Kansas, where it is now working. About seven years old. Has recently been thoroughly overhauled. Box 180-LSD.

1 70-C BUCYRUS, 2½ or 3-yard dipper, on caterpillars. Steam. Box 183-LSD.

BUCYRUS 70-C, Shop number around 1500. Thoroughly overhauled. Good working condition. Eastern location. Box 299-LSD.

If You Do Not Find What You Want Listed—Write Us

The Excavating Engineer
South Milwaukee Wisconsin

BUCYRUS STANDARD RAILROAD - TYPE SHOVEL No. 70-C, shop number 1300, 2½-yard dipper, f. o. b. railroad tracks, shipping point Virginia. Address Box 265-LSD.

Monighan Track Type Dragline; 72-foot boom, 2½-cubic-yard Omaha bucket; Almost new Page Diesel engine; Machine now working northern Illinois. Priced to sell. Box 305-LSD.

TWO 70-C SHOVELS, mounted on cats. In good condition. Priced to sell. Address Box 266-LSD.

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For Sale or Rent

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Miscellaneous Equipment

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32—12-yd. Western Heavy Duty Dump Cars
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2—PAGE "C" 1-CUBIC-YARD DRAGLINE BUCKETS.

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5—5-yard Continental dump cars.
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FOR SALE

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Continued

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6—8-yard Western—36-inch Gauge—2-way side.

LOCOMOTIVES

1—15-ton, 10x14—36-inch Gauge—Vulcan Saddle Tank.
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BOILERS

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1—32 h.p. Locomotive Type Stationary.

Box 181-ME

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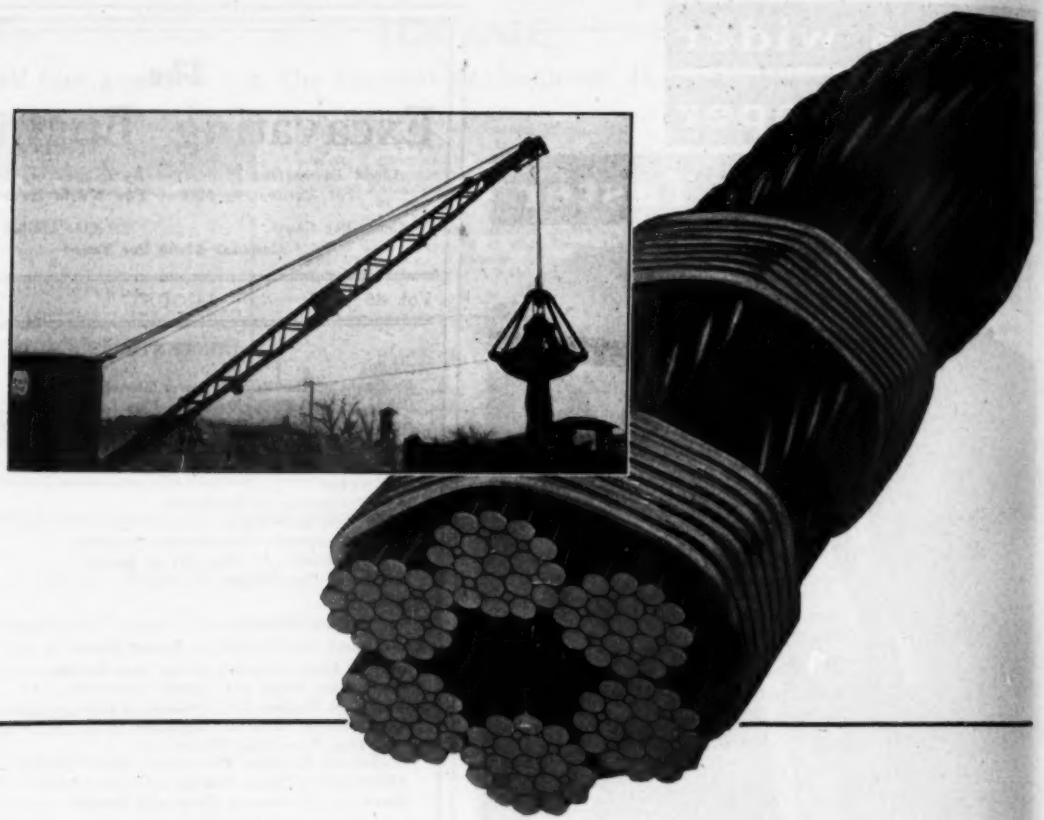

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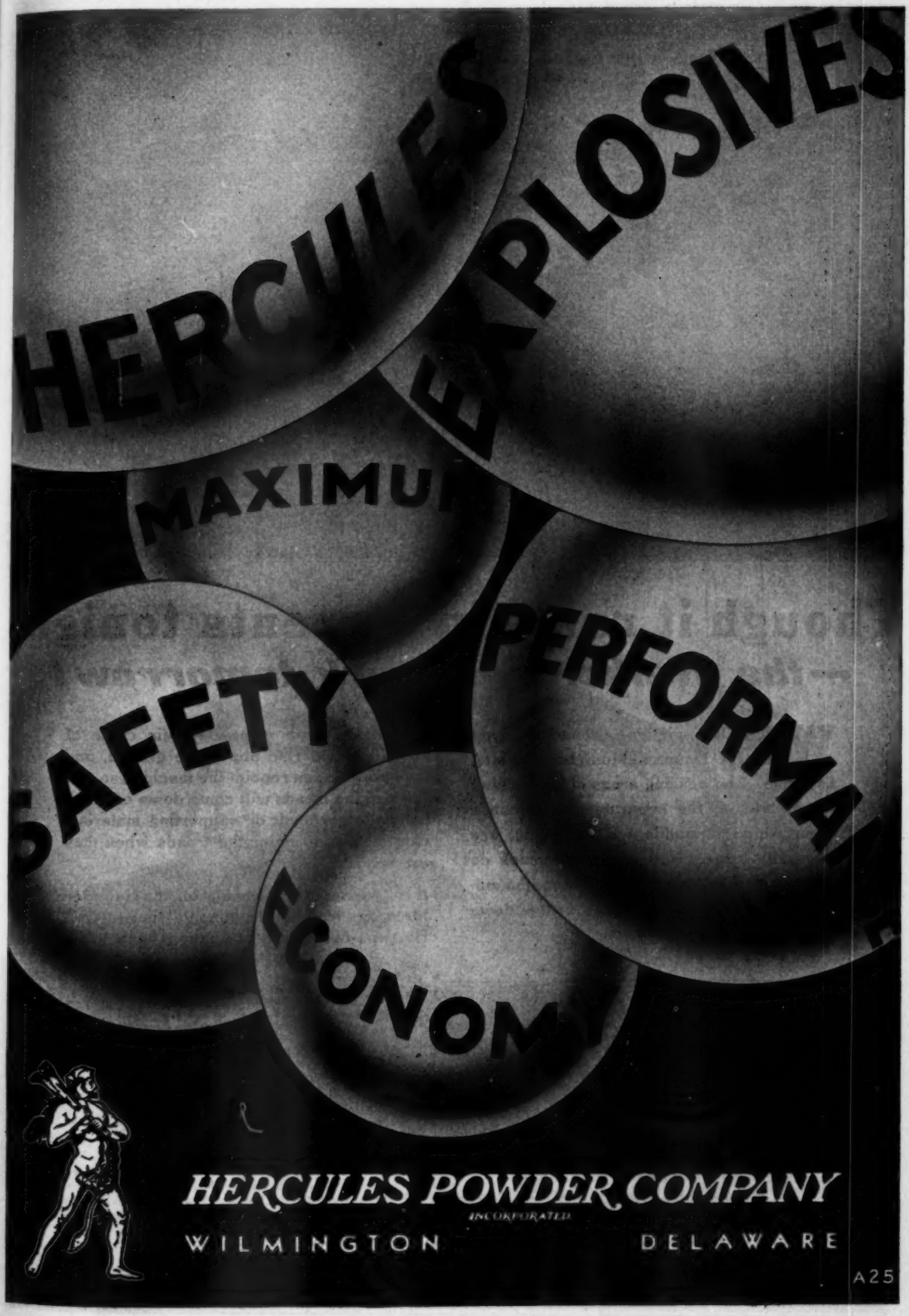

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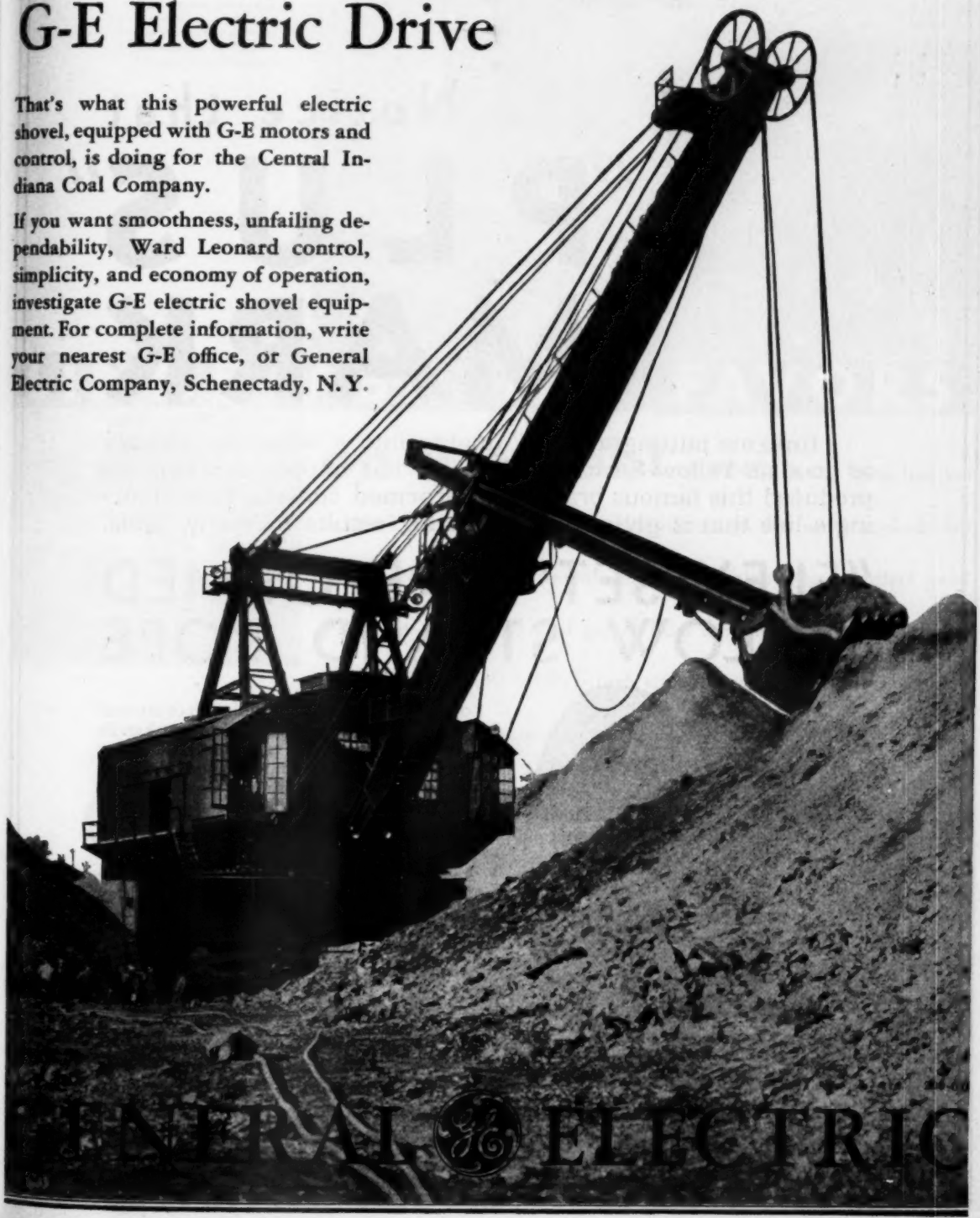

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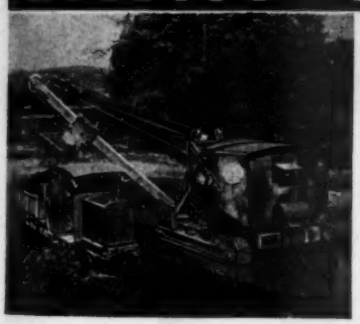

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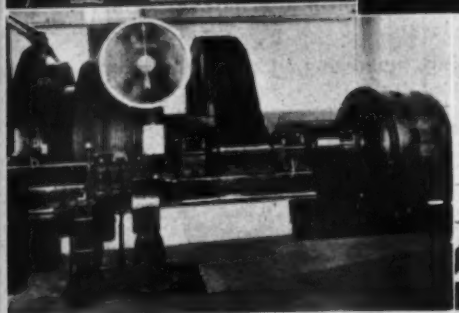
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